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"There is a constant need in the field of public health to keep abreast of the latest developments in pharmacy and it is the University's responsibility to assist the practicing pharmacists and to keep them in touch with pharmaceutical research."—Kenneth L. Water, University of Georgia.

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Predicting Success in Pharmaceutical Education

H. H. REMMERS AND A. J. DRUCKER
Purdue University

Background

In 1946 we measured abilities, achievements and interests of pharmacy freshmen the country over. In 1948 Senior Comprehensive Examinations in Pharmacy were developed and tried out on the national sample of pharmacy seniors. In the Spring of 1950 these examinations were given to those students, previously tested in 1946 as freshmen, who were about to complete four years of pharmacy training. This report presents critical facts of pharmaceutical education by relating these freshman measurements to measures of pharmacy training success, such as the scores on the standardized Senior Comprehensive Examinations, grades within the institution, and drop-out data.

The Predictive Measures. Standardized tests administered to pharmacy freshmen in 1946 were on face thought to be highly relevant predictive measures of ultimate success in pharmaceutical education. They also served to give a comparison of the interests and abilities of freshmen in American schools of pharmacy with those of freshmen in other curricula in American colleges and universities. Five such tests, forming the predictive battery of the present validation study, were administered in the Fall of 1946 to over 3,000 pharmacy freshmen in all eight of the districts of the American Association of Colleges of Pharmacy and of the National Association of Boards of Pharmacy. The five tests, the American Council on Education Psychological Examination for College Freshmen, 1946 Edition, the Cooperative English Test, Form PM, the Purdue Mathematics Training Test, Form XM, the Purdue Physical Science Test, Form AM, the Pharmacy Background and Personal Data Blank have been described in adequate

detail in Monograph No. 1.* The Kuder Preference Record was also administered at that time to pharmacy freshmen of ten selected colleges and universities.

On the basis of the Psychological Examination, a test of general scholastic ability, it could be concluded that since pharmacy freshmen did not differ in any "educationally significant way" from non-pharmacy freshmen in the abilities measured, little selection of pharmacy students on an intellectual basis was apparently operating, either positively or negatively, other than that affecting college students in general. These results were cited as refutation of a traditional belief that schools of pharmacy as compared with other institutions work with intellectually inferior raw material.

Monograph No. 1 also reports an investigation of the differences in scholastic ability and achievement between freshmen entering schools of pharmacy and those entering other schools *within the same university*. Based on test results from ten institutions, pharmacy freshmen were, at least in the years considered, generally inferior to arts and science and engineering freshmen and generally superior to agriculture and home economics freshmen in their performance on tests of scholastic ability and achievement. The preference patterns of these pharmacy freshmen are sharply distinguishable from those of high school pupils and of adults in general, but correspond well with those of advanced women students in pharmacy and with those of male drugstore managers and pharmacists. There is also evidence, however, that male pharmacy freshmen lack the high scores on the Persuasive Scale of the Kuder Preference Record that characterized adult drugstore managers and pharmacists.

The Prediction of Scholastic Mortality.**The first test of validity of the predictive test battery was made in relating scores of the predictive test battery to withdrawals during the first two years of training from the schools of pharmacy. Apart from the Pharmacy Background Test, the predictive tests were all approximately equal in their ability to predict withdrawal from colleges of pharmacy. The Pharmacy Background Test, although promising as a measure of interest in pharmacy, and the Kuder

*Remmers, H. H. & Gage, N. L. *The Abilities and Interests of Pharmacy Freshmen*, Monograph No. 1, The Pharmaceutical Survey, 1946, pp. 12-13.

**Remmers, H. H. & Gage, N. L. *Student Personnel Studies of The Pharmaceutical Survey*. Monograph No. 3. The Pharmaceutical Survey, 1949.

Preference Record seemed to be of no value in predicting withdrawal from the Pharmacy curriculum.

Development of the Senior Comprehension Examinations.* The achievement Testing Program of The Pharmaceutical Survey had as it general objective the development of a set of measuring devices that would yield a maximally valid ranking of pharmacy students with respect to their achievement in training. Four short-answer machine-scorable comprehensive examinations were constructed in each of the four major fields of pharmaceutical education—Pharmacy, Pharmacognosy, Pharmacology and Pharmaceutical Chemistry. Subcommittees prepared detailed outlines of the general and specific objectives of instruction and training in each of the four fields. They then constructed short-answer test items from the specific objectives weighting each item as to its importance to the total achievement of the pharmacy students in each branch of the pharmaceutical curriculum. The examination consisted of a total of 1024 test items and required approximately 12 hours to administer.

Purposes and Procedures

Criteria of Success. Success in pharmacy in this study necessarily has to be defined in terms of indices of success in pharmacy *training*. Of the possibilities of measuring success in training, the most obvious is that of achievement in the curriculum. Another could be whether or not an individual survived the training program. As discussed in Monograph No. 1, the usual measure of achievement in any curriculum is the grade received by the trainee, which, however, is a very unreliable criterion of success, because not only do grading standards vary from institution to institution but from instructor to instructor in the same institution as well. They are, therefore, a "yardstick" without standard meaning. It was this consideration that led to the development of the Senior Comprehensive Examination in Pharmacy for administration to students all over the country as a single standardized reliable yardstick on which individuals and institutions could be compared.

For the validation study the statistically most reliable measure of success in pharmacy training would unquestionably be scores on the Senior Comprehensive Examinations. Grades were adopted

Ibid., App. F., pp. 115-118.

as a second type of criterion of success, to be used mainly in intra-institution comparison. The third type of criterion used in these studies, survival in the program, is probably also a reliable intra-institutional measure, but perhaps not a good *inter*-institutional one, since survival in a given institution may be and probably is very much a function of the academic standards within that institution.

What this Validation Study Should Reveal. The objectives of this study are included in the following questions involving a consideration of the above three types of criteria:

1. **How well do the five tests and their parts given to 1946 freshmen, optimally-weighed, predict performance four years later on each of the four Senior Comprehensive Examinations and their total?**
2. **For a representative group of five schools having the same grading system, how well do the predictive tests predict:**
   a) **the 4-year average grade in all courses?**
   b) **the 4-year average grade in all pharmaceutical courses only?**
   c) **the 4-year average grade in all non-pharmaceutical courses only?**
   d) **the average senior grade?**
3. **To what extent are average grades in the four pharmaceutical curriculum areas and the corresponding Senior Comprehensive Examinations tending to measure the same thing?**
4. **How well is survival in the complete pharmacy curriculum predicted by the predictive tests?**

Obtaining the Data for the Study. To obtain scores on the Senior Comprehensive Examinations for students who had taken the five predictive tests in 1946, the following letter and form was sent to secure the cooperation of institutions in this phase of the study.

Dear Dean:

Funds have recently became available to carry on the validation study proposed in the two monographs, Abilities and Interests of Pharmacy Freshmen and Student Personnel Studies of the Pharmaceutical Survey.

This study will result in more adequate knowledge of how to predict success in pharmacy training than has heretofore been available and will, therefore, to the extent that prediction is improved, also improve the effectiveness of selection, guidance, and placement procedure in pharmaceutical education.

It is obviously necessary that the colleges of pharmacy whose freshmen were tested in the fall of 1946 participate in this valida-

tion study. At a minimum, this would require the following of your institution. Examinations will cover pharmaceutical chemistry, pharmacology, pharmacognosy, and pharmacy. They require approximately twelve hours testing time and supervision by at least one responsible staff member in each institution. The Comprehensive Senior Examinations in Pharmacy will be provided without cost to participating institutions. They will be centrally scored and the results for your seniors will be sent to you some weeks after the examinations.

The dates of the examinations should obviously come as near the end of your semester or quarter as possible. It will probably be possible to have the scores of your seniors in the mail within 48 hours of our receipt of your answer sheets. This might make it possible for you to use these scores in grading seniors. In any case, however, to insure adequate motivation of the students, they should be told that their scores will be sent to the secretary of the National Association of Boards of Pharmacy.

To enable appropriate planning by the staff of the Student Personnel Studies, you are requested to fill out and return the attached form before March 1 to H. H. Remmers, Student Personnel Studies, Purdue University, Lafayette, Indiana. (A duplicate form is provided which may be retained in your own files).

Very sincerely yours,
(Signed) Edward C. Elliott
Director

P.S. For your convenience, a stamped envelope, addressed to Dr. Remmers, is enclosed.

Comprehensive Senior Examinations in Pharmacy, Spring 1950

Note: This form should be returned to H. H. Remmers, Student Personnel Studies, Purdue University, Lafayette, Indiana before March 1, 1950.

Name of Institution.....Date.....

1. Will your institution participate in the Comprehensive Senior Examination in Pharmacy at the end of the spring semester or quarter, 1950?

Please encircle: Yes No

Answer the following questions only if you encircled Yes.

2. The number of seniors expecting to graduate from this institution this spring is.....

3. The dates (four 3-hour sessions will be required) on which these examinations will be given are.....
Month Days

4. The examination materials and instructions should be sent to:

.....

Name of individual

.....

Address

5. The examination results should be sent to:

.....

Name of individual

.....

Address

Signed by:.....

Official position.....

The above form was received from 31 institutions by the Division of Educational Reference at Purdue University, which filled orders for test materials, scored examinations upon their arrival and reported scores to the institution and to the National Association of Boards of Pharmacy.

In order to make use of actual Pharmacy grades received by students as criteria of success, information concerning grades was solicited from each of the 31 institutions which had administered the Senior Comprehensive Examinations to its students. This was done by means of the following letter and instructions:

June 12, 1950

Dear Dean:

The Predictive Testing Program of The Pharmaceutical Survey carried out in the fall of 1946 is, as you know, at present undergoing validation against the Senior Comprehensive Examination in Pharmacy. This is all that the validation program has mandated to it, but educators in pharmacy will doubtless be interested in further validating information. In this belief, we are sending you the accompanying form to provide us with the necessary data for studying the predictiveness of these tests against the data called for in this form.

If you can provide this information for us by July 15 or earlier we shall include it in the study.

It is obvious to you, of course, that this information for your individual institutions should be quite valuable to you in assessing your selection and guidance practices, your curriculum, and possibly even instructional practices.

It goes without saying that the anonymity of all institutions included in the study will be strictly maintained.

Your cooperation in this phase of the Student Personnel Studies of The Pharmaceutical Survey will be most genuinely appreciated. We shall look forward with interest to your early reply.

Yours cordially,

H. H. Remmers, Director

Student Personnel Studies

HHR:bc

Evaluative Information Requested from Institutions Participating in the Pharmaceutical Survey, 1949-1950

In Column 1 of the accompanying form appear the names of all Pharmacy students of your institution who took part in the Predictive Testing Program of The Pharmaceutical Survey in 1946. To assess to the fullest the efficacy of these tests in predicting success in Pharmacy achievement for your own institution, it is necessary to have certain information concerning each student tested at that time. First we wish to be able to account for every one of these students in terms of their present status with respect to their Pharmacy programs (Column 2). Most of them presumably are graduating seniors this June. Others may have dropped out of the program or transferred to other academic areas. Still others may, for some reason, be graduating from this program later than expected. Finally, there are probably some, because of the G. I. Bill or other reasons, who have already finished their work.

The other columns of the enclosed form refer to the grades made by these pharmacy students. Column 3 requests for each student his average grade over his four years at your institution. Column 4 requests his average grade for work done only in the Senior year. Columns 5-12 call for the student's average grade for all work done in the four pharmaceutical areas separately—Pharmacology, Pharmacognosy, Chemistry and Pharmacy—plus the number of semester or quarter hours for each. In Column 13 we would like to get the student's average grade in all his non-pharmaceutical courses.

We shall send you the results of the analysis for your institution as soon as possible. You will also, of course, receive a final report of the total national project. In this national report no institution will be identified.

In order to make these averages meaningful, please describe briefly the grading system used in your institution, whether a number or letter system or both.

Grade Symbol (Letter or Number) **Definition of each grade**

Was the Senior Comprehensive Examination used in determining the final semester or quarter grade?

Yes..... No.....

If so, what weight was given it?

Complete grading information as requested above was supplied by 20 institutions. Incomplete grading information was given by two institutions. Nine institutions either did not supply information concerning grades or supplied such information too late to be used in the analysis. Complete sets of data consisting of the five predictive test scores and their part scores, and the four Senior Comprehensive Examination scores, were available for 956 students of 15 institutions for the validation studies using the Senior Comprehensive Examinations as criteria of success.

Statistical Analysis and Results

A random split of the 956 Senior pharmacy students was made in order to furnish a sample of 473 students for analysis, and a similar "hold-out" sample of 473 students for validation. Table 1 shows means and standard deviations of predictive scores and of the 1950 achievement test scores. The predictive score statistics have been computed both for the entire entering freshman group of over three thousand, as presented in Monograph No. 1* and for the analysis sample of 473 Seniors. The means and standard deviations for the Senior Comprehensive achievement test scores are shown only for the analysis sample of 473 Senior students. Reliability coefficients, where available, are also shown for each test.

Mean scores on the predictive tests are higher for the Senior group than for the entire freshman group in 1946. This is to be expected, since the less able students tend to drop out. For the same reason, standard deviations tend to be smaller for the Senior group than for the entire freshman group in 1946 in that smaller, more select ranges of talent are represented in this group. Case

*Remmers, H. H. & Gage, N. L. *The Abilities and Interests of Pharmacy Freshmen.* Monograph No. 1. The Pharmaceutical Survey, 1946.

IV reliability** may differ slightly from those computed in 1948 on the Senior Comprehensive Examinations since a different sample of pharmacy seniors was used at that time.

TABLE 1

Means and Standards Deviations of Eight Predictive and Five Achievement Test Scores

Test	Number of Items	Arithmetic Mean Total 1946 Freshmen	Arithmetic Mean 1946 Freshmen Completing Training	Standard Deviation Total 1946 Freshmen	Standard Deviation 1946 Freshmen Completing Training	Kuder-Richardson Reliability, Case IV
PREDICTIVE						
A.C.E. Q-Score	80	40.22	42.02	11.72	10.77	.839
A.C.E. L-Score	120	65.00	68.34	16.85	15.75	.888
Coop. English						
English Usage*	150	49.20	51.24	9.18	8.70	
Spelling*	45	51.18	53.13	11.24	10.98	
Vocabulary*	100	57.03	58.47	10.87	10.51	
Mathematics	80	32.42	35.33	11.15	11.84	.870
Physical Science	122	70.55	73.35	15.00	13.67	.850
Pharmacy Background	45	26.86	26.86	6.88	6.90	.791
ACHIEVEMENT						
Pharmacy	250	134.17		21.96		.874
Pharmacology	174	92.08		13.99		.783
Pharmacognosy	300	131.01		22.64		.859
Pharm. Chemistry	300	153.14		30.36		.922
Total	1024	510.40		61.97		.934

**Adkins, Dorothy. *Construction and Analysis of Achievement Tests.* Washington: U. S. Government Printing Office, 1947, p. 154.

*Since scaled scores only were available on the Cooperative English Battery, no reliability coefficient involving item constants could be readily computed, and means and standard deviations are not to be compared against "Number of Items".

Just as adequacy of preparation for pharmacy training was investigated in various ways, i. e., by numerous ability and interest test scores, so has predicted achievement in pharmacy training been examined in various ways. Finding a single, over-all, clear-cut index of success in pharmacy is unlikely. In defining success in pharmacy training we have included in this study no fewer than 13 factors: five separate scores on the Senior Comprehensive Examinations, seven separate grade averages, and survival in the program. Each of the criteria for judging the success of pharmacy students can be compared with each "measure of potentiality", by a validity coefficient, the correlation coefficient between the scores of one criterion and one prediction measure. The correlation coefficient found between scores on the Purdue Physical Science Test and scores on the Pharmacognosy Senior Comprehensive Examination, for example, represents the extent to which one may predict from Physical Science scores made by students *who will be Seniors* the scores they will make on the Pharmacognosy Senior Comprehensive Examination four years later, when they finish their pharmacy education. Such a correlation does not take into account the Physical Science scores made by freshmen who ultimately dropped out of their programs, although it may be possible under some circumstances to estimate such correlations. Table 2 gives the 40 correlation coefficients found between each of the eight predictive test scores and each of the five achievement criteria scores, and the 28 intercorrelations among the eight predictive test scores, all for the analysis sample of 473 1950 Pharmacy Seniors. A group of 68 correlation coefficients, each representing a specific magnitude of relationship between a predictor and something predicted, becomes difficult to interpret. They can be combined into more unitary and meaningful indices of pharmacy education success by a procedure described below.

How well do the five tests and their parts given to 1946 freshmen, optimally-weighted, predict performance four years later on each of the four Senior Comprehensive Examinations and their total taken as five separate criteria of pharmaceutical training success?

TABLE 2

Intercorrelations Among 8 Predictive and 5 Criterion Scores of 473 Pharmacy Seniors

Predictive Scores	1	2	3	4	5	6	7	8
1. A.C.E. Q-Score								
2. A.C.E. L-Score	.460							
3. English Usage	.453	.628						
4. Spelling	.293	.535	.593					
5. Vocabulary	.271	.733	.544	.568				
6. Mathematics	.432	.325	.400	.232	.186			
7. Physical Science	.556	.628	.493	.309	.413	.594		
8. Pharmacy Background	.283	.317	.221	.178	.242	.058	.402	
Criterion Scores								
9. Pharmacy	.317	.365	.272	.204	.304	.309	.378	.245
10. Pharmacology	.145	.367	.248	.149	.308	.174	.270	.250
11. Pharmacognosy	.190	.371	.242	.237	.339	.240	.302	.165
12. Chemistry	.329	.384	.343	.244	.309	.380	.418	.214
13. Total	.376	.536	.409	.312	.452	.422	.510	.309

Table 2 shows that correlations range from .145 between Pharmacology scores and the A.C.E. Q-Score and .418 between Chemistry scores and the Purdue Physical Science Test. Other correlations of predictive tests with the Senior Comprehensive Examination part scores range within these limits. Correlation coefficients between the total Senior Comprehensive and the predictive tests range from .536 for the A.C.E. L-Score to .309 for Pharmacy Background. From these intercorrelations our object has been to select the optimal battery or combinations of these eight predictive variables that would have best predicted the actual achievement scores obtained. The Wherry-Doolittle Test Selection Method* was used for so selecting and weighing tests to form an optimal battery. Using validity coefficients involved between each predictive test and each criterion plus the inter-correlations among the predictive tests, the Wherry-Doolittle Method selects the best tests in order of their contribution to the multiple prediction equation to form the battery with a minimum of computational work. This technique also shows the cumulative coefficient of multiple correlation and assigns the proper partial regression weights to each of the selected sets of tests.

The multiple correlation coefficients between each Comprehensive Examination criterion score and the best tests selected to predict the given score are given in the second column of Table 3 for the Pharmacy, Pharmacology, Pharmacognosy and Chemistry parts of the Senior Comprehensive Examinations and for the total of those parts. Tests in order of importance in the most predictive battery appear in Column 3. This is actually the order in which the predictive tests were selected by the Wherry-Doolittle technique, a selection according to the relative contribution made by each predictive test. Equations for predicting from predictive raw or scaled scores any individual's part score or total on the Comprehensive Examinations appear in the fourth column of Table 4. The last column in Table 4 provides an estimate of the accuracy of prediction in subsequent similar samples using the equation

*Stead, W. H., Shartle, C. L. & Associates. *Occupational Counseling Techniques.* New York: American Book Company, 1940, App. V, pp. 245-252.

TABLE 3

Multiple Correlations and Regression Equations of Optimum Predictive Test Batteries* versus the Senior Comprehensive Examinations

Criterion Measure	Multiple Correlations Predictive Tests Uncorrected for Restriction of Range	Predictive Tests Corrected for Restrictoin of Range	Tests in Order of Importance in Most Predictive Battery (order of selection by Wherry-Doolittle process)	**Test Battery and Regression Equation for Optimum Prediction of Criterion Test Score Y	Estimated Predictive Efficiency: Correlation Using Column (4) Weights Applied to a Different Sample of Seniors***
Pharmacy Achievement Scores	.457	.476	M, PB, V, L, Q, PS	Y = .38852 PB + .31023 M + .23850 V + .19523 Q + .10441 L + .10219 PS + 73.188	.475
Pharmacology Achievement Scores	.418	.438	L, PB, V, M, S, Q	Y = .33693 PB + .25111 L + .15974 V + .12835 M — .12834 S — .10642 Q + 63.284	.315
Pharmacognosy Achievement Scores	.413	.431	L, V, M, U, PB	Y = .37087 V + .30558 L + .30531 M + .19700 PB — .16125 U + 80.629	.396
Pharmaceutical Chemistry Achievement Scores	.484	.517	M, L, V, PS, PB, Q	Y = .59484 M + .35896 PB + .29979 V + .22175 L + .20920 Q + .20253 PS + 66.160	.498
Total Senior Comprehensive Achievement Scores	.629	.677	M, L, V, PB, PS	Y = 1.34472 M + 1.31102 PB + .96123 V + .91807 L + .38655 PS + 280.504	.603

*Q = ACE Q-Score; L = ACE L-Score; U = Coop Eng—English Usage; S = Coop English—Spelling; V = Coop English—Vocabulary; M = Mathematics Placement; PS = Physical Science; PB = Pharmacy Background.

**These weights are to be applied to the *raw scores* obtained on all tests except the Cooperative English Tests (English Usage, Spelling and Vocabulary), where *scaled scores* are to be used.

***Thorndike, R. L., *Personal Selection Test and Measurement Techniques.* New York: John Wiley & Sons, Inc., 1949, p. 188.

described in the fourth column. The accuracy estimate is also in terms of a correlation coefficient. It is the actual correlation between the predicted criterion scores for the second "hold-out" sample, an additional 473 pharmacy seniors, using the regression equations computed from the first sample, and the actual criterion scores for this "hold-out" sample. Thus, we see the regression equations obtained may predict fairly well the Senior Comprehensive Examination scores when applied to groups other than the one in which they were based.

Column 2 of Table 3 lists two sets of multiple correlation co-efficients. The first set of co-efficients was computed without taking into account the diminishing effect of the narrower range of talent present in the predictive scores of the select group of surviving Seniors. It is this set of multiple correlation coefficients that corresponds to the data in Columns 3, 4 and 5—the relative importance of predictive test scores selected, the equations for use with raw and scaled scores for predicting individual performance, and the accuracy of prediction coefficients. Rough approximations of the multiple correlation coefficients that might have been attained had it been possible to take into account such range curtailment are given in the second set of multiple correlation coefficients. We would not, however, have had the statistical means, nor the theoretical justification, according to one authority, to have based our prediction equations upon inter-correlations which take into account the ultimate selection of pharmacy students that operates in any given institution, and its resultant curtailment of range of talent. The reason given is that elimination of less capable or interested pharmacy students has been based in most, if not all, institutions, on various intangible factors which cannot be combined into a score. One does not know how to estimate the extent to which the validity coefficient for any test procedure has been affected by such selection.*

*Thorndike, R. L. *Personnel Selection Test and Measurement Techniques.* New York: John Wiley & Sons, Inc., 1949, pp. 175-176.

From Column 3 of Table 3 we now see that the Pharmacy Background Test, while not of much value in predicting academic mortality or first-semester grades four years ago, is of some value in predicting Senior Comprehensive achievement. Here we may note in particular that Mathematics scores, Vocabulary scores on the Cooperative English Test and A.C.E. L-Scores are of considerable importance in predicting scores on these measures of pharmacy achievement. Weights in Column 4 are not to be construed as representing order of importance of tests in the prediction batteries. They are in part determined by the size of the scores on the test. Now, for example, when we apply the prediction equation to Pharmacognosy scores, we weight the Vocabulary score, the L-score and the Mathematics score rather heavily. Lighter weighting of the Pharmacy Background score is used and *negative* weighting of the English Usage score. The negative weighting in this case probably means that the L-Score selected overpredicted the linguistic factors in the criterion, and that negative weighting of the English Usage score functions as an adjustment.

How well do the predictive tests predict the four-year average grade in all courses, the four-year average grade in all pharmaceutical courses, the four-year average grade of all non-pharmaceutical courses and the average senior grade?

Three institutions were located having the same grading system, 3 to 0, and two more institutions were selected whose grades could be readily converted from their original systems to the 3 to 0 grading system. Selection was made on two main bases: 1) the five institutions were well-scattered geographically; 2) high, middle and low scholastic standards were represented, using for selection the 1946 ranking of the institutions of this survey of pharmacy freshmen on the A.C.E. total score.

Suspicions that the average grades are not an adequate *national* criterion of pharmaceutical training success, even when such grades have been set to the same numerical scheme, were borne out in this part of the study. Tables 4 to 7 show the multiple correlation coefficients between the eight predictive variables and the four average grade criteria enumerated above for each of the five schools. No multiple correlation coefficient computed for schools

TABLE 4

Multiple Correlations of Predictive Test Battery Versus Four-Year Average Grades in All Courses

College Number by Freshman Rank on A.C.E. Psych. Exam.	Number of Students	Multiple Correlation	Tests in Order of Importance in Most Predictive Battery
1	39	.363*	English Usage, A.C.E. Q-Score Mathematics
10	20	.463	Physical Science
14	28	.624	English Usage, Mathematics, Vocabulary, Physical Science, Spelling
23	56	.450	Mathematics, Pharmacy Background, A.C.E. Q-Score, Vocabulary
42	20	.482*	A.C.E. Q-Score, A.C.E. L-Score, Vocabulary.
Total	163	.145*	Mathematics

*Not Significant at the 5% level.

TABLE 5

Multiple Correlations of Predictive Test Battery Versus Four-Year Average Grade in All Pharmaceutical Courses

College Number by Freshman Rank on A.C.E. Psych. Exam.	Number of Students	Multiple Correlation	Tests in Order of Importance in Most Predictive Battery
1	39	.209*	Mathematics
10	20	.508	Physical Science, A.C.E. L-Score
14	28	.518	English Usage, Vocabulary, Physical Science.
23	56	.440	Mathematics, Pharmacy Background A.C.E. Q-Score
42	20	.550*	Pharmacy Background, A.C.E. L-Score, Vocabulary, A.C.E. Q-Score
Total	163	.256	A.C.E. L-Score, Physical Science, A.C.E. Q-Score, Pharmacy Background, Spelling, English Usage

*Not Significant at the 5% level.

TABLE 6

Multiple Correlations of Predictive Test Battery Versus Four-Year Average Grade in All Non-Pharmaceutical Courses

College Number by Freshman Rank on A.C.E. Psych. Exam.	Number of Students	Multiple Correlation	Tests in Order of Importance in Most Predictive Battery
1	39	.434*	English Usage, A.C.E. Q-Score, Mathematics
10	20	.727	A.C.E. L-Score, Mathematics, English Usage, A.C.E. L-Score
14	28	.684	Spelling, Physical Science, Vocabulary, English Usage
23	56	.522	Mathematics, Vocabulary, A.C.E. Q-Score, Pharmacy Background
42	20	.563*	English Usage, Pharmacy Background, Physical Science
Total	163	.293	Mathematics

*Not Significant at the 5% level.

TABLE 7

Multiple Correlations of Predictive Test Battery Versus Senior Average Grade

College Number by Freshman Rank on A.C.E. Psych. Exam.	Number of Students	Multiple Correlation	Tests in Order of Importance in Most Predictive Battery
1	39	.135*	English Usage
10	20	.629	English Usage, Vocabulary, A.C.E. L-Score
14	28	.514	Spelling, Mathematcis
23	56	.442	Mathematics, Pharmacy Background, A.C.E. Q-Score, A.C.E. L-Score
42	20	.458*	English Usage, Phamacy Background
Total	163	.232*	Mathematics, Spelling, Vocabulary, Physical Science, A.C.E. Q-Score

*Not Significant at the 5% level.

1 and 42 is high enough to be significant at the 5 percent level of confidence, nor are the multiple correlation coefficients for all five schools together in predicting grades in all courses and in predicting senior grades. The multiple correlation coefficients obtained for all five schools are lower in all probability because a given numerical grade in one of the five institutions may not mean the same potential performance as in another of the five institutions; the yardstick of grades changes from one institution to the next.

Nevertheless, to judge from the contents of Tables 5 and 6, there may be some basis for hypothesizing that the original predictive battery does as good a job or better of predicting *non*-pharmaceutical grades as pharmaceutical grades, not only for the total sample of student but for the students of each of the five institutions separately. If true, this is not surprising in view of the fact that the predictive tests are *designed* to measure "general" scholastic achievement. It is also interesting to observe that a test of some kind of linguistic ability is the best chosen first by the Wherry-Doolittle technique in four out of five institutions to predict *non*-pharmaceutical grades, while in the prediction of *pharmaceutical* grades for four out of five institutions a test that measures scientific or mathematical ability or pharmacy background is chosen first. These facts constitute interesting and promising leads for possible future research designed to improve prediction of achievement in the technical areas of the pharmacy curriculum.

Since the Wherry-Doolittle technique of computing regression equations is a very lengthy process, it was not feasible to compute separate equations for each institution in the survey. However, we did compute correlations between four of the predictive tests and the four-year grades for 15 institutions. The predictive tests selected were the A.C.E. Psychological Examination Total, the Cooperative English Total, the Purdue Mathematics Training Test, and the Purdue Physical Science Test. Table 8 gives these correlations, many of which are so close to zero that in terms of their standard errors and relationships they might be no more than chance ones.

TABLE 8

Correlation Coefficients Between Average Grades in All Courses and Four Predictive Tests for 564 Students in 15 Institutions

Institution Number	Number of Students	A.C.E. Psych. Total	Cooperative English	Purdue Mathematics	Purdue Physical Science
1	48	.084*	.095*	.194*	.184*
6	8	.870	.777	.755	.698
8	54	.327	.364	.521	.310
10	20	.152*	.183*	.269*	.463
12	42	.085*	—.059*	.341	.247*
14	29	.375	.439	.299*	.418
15	12	—.028*	.126*	—.320*	—.149*
17	17	.313*	.174*	.494	.616
19	101	.377	.420	.242	.163*
21	19	.210*	.082*	—.079*	.060*
23	57	.159*	.246	.358	.272
24	55	.349	.316	.192*	.247
27	30	.365	.161*	.584	.512
33	53	.115*	.269	.325	.249
42	20	.036*	—.039*	.044*	—.038*

*Not significantly different from zero (5% level).

To what extent are average grades in the four pharmaceutical areas and the corresponding Senior Comprehensive Examinations tending to measure the same thing?

This analysis was done for institutions separately and for the overall national sample of students on whom all relevant data had been supplied or obtained. Fifteen institutions had supplied information required for this analysis on from 8 to 101 of their pharmacy seniors. As Table 9 shows, for some institutions there are high relationships between scores made on the Senior Comprehensive Examinations and grades given by instructors in those areas; for other institutions these relationships are slight. Median correlations ranged from .43 to .64. In a few instances, however, Senior Comprehensive Examination scores were used in determining grades. In such cases the correlations are spuriously high. In other cases some of the correlations obtained are so low for the number of cases available, that the relationships cannot be said to be real or significant ones.

How well is survival in the pharmacy curriculum predicted by the predictive tests?

The biserial correlation coefficient between the predictive tests and whether a student is still in training after four years was used in predicting survival in the pharmacy program. Table 10 summarizes such information for ten predictive tests and their sub-parts for 14 institutions.

From the range of biserial correlation coefficient it may be surmised that lack of potential achievement in pharmacy on the part of a freshman does not tell the entire story of why a student withdraws from the program. Loss of interest, lack of funds, and ill health are other possible reasons for withdrawal not included in our study.

TABLE 9

Correlation Coefficient Between Scores Made in Pharmacy, Pharmacology, Pharmacognosy, and Pharmaceutical Chemistry Comprehensive Examinations and Grades Received in Corresponding Courses for 564 Students in 15 Institutions

Institution Number	Number of Students	GRADE VERSUS EXAMINATION SCORE			
		Pharmacy	Pharmacology	Pharmacognosy	Chemistry
1	48	.686(S)	.601(S)	.431	.641(M)
6	8	.939	.744	.803	.952
8	54	.635(S)	.573(S)	.747(S)	.682(S)
10	20	.174(S)	.509(S)	.413(S)	.428(S)
12	42	.233*	.248*	.298	.491
14	29	.485	.474	.563	.522
15	12	.591(S)	.137*	.118*	.806
17	17	.770	.661	.351*	.833
19	101	.403	.414	.467(M)	.517
21	19	.565	.585	.038*	.303*
23	57	.532	.434(M)	.532	.593
24	55	.425	.790	.588	.684
27	30	.428(M)	.718	.669	.437
33	53	.619	.396	.552	.685
42	20	.231*	.352*	—.136*	.655

(M) Median correlation coefficient in column ignoring coefficients marked (S).
(S) Score was used in determining grade, resulting in spuriously high correlation.
* Not significantly different from zero (5% level).

TABLE 10

Biserial Coefficients of Correlation Between Student Withdrawals and Scores on the Predictive Tests

College	PSYCHOLOGICAL			ENGLISH				Phys.	Pharm.	Math.
	TOTAL	Q	L	TOTAL	I	II	III	Sci.	Bkgrd.	
1	.248	.326	.290	.254	.271	.246	.145	.422	.400	.012
6	.351	.113	.349	.099	.050	—.006	.312	.259	.281	.104
10	.231	.348	.037	.128	.004	.141	.214	.362	.426	.259
12	.237	.207	.273	.234	.271	.041	.294	.152	.173	.276
16	—.003	.141	—.101	.....	.....	.....	.....	.201	.217	.123
17	.253	.208	.188	.481	.350	.277	.589	.534	.320	.088
19	.456	.496	.345	.415	.423	.213	.295	.458	.347	.047
21	.253	.069	.292	.362	.164	.341	.391	.372	.103	.471
23	.323	.290	.259	.388	.353	.214	.422	.281	.520	.423
24	.322	.239	.335	.271	.278	.378	.182	.358	.426	.043
27	.300	.289	.217	.207	.377	.199	.132	.422	.404	.337
30	—.056	.331	.094	.265	.577	.115	.036	.431	.460	.262
33	.351	.195	.359	.316	.240	.188	.362	.355	.513	.208
38	.334	.412	.235	—.204	.283	.276	.155	.186	.291	.248
Range										
	—.056	.069	—.101	—.204—	.004	—.006	.136	.152	.103	.012
	.456	.496	.359	.481	.577	.378	.589	.534	.520	.471

As was noted in the withdrawal study of two years ago*, the coefficients tend to be of the same magnitude for a given school, indicating that predicting student survival in pharmacy by means of test scores tends to be more successful for some schools than for others. The predictive tests given in 1946 appear to be of considerable value as potential predictors of survival in the program even four years later.

Table 11 lists the frequency distributions of biserial coefficients of correlation by test to indicate at a glance the relative importance, at least for these 14 available schools, of each test in predicting survival in the program. The median biserial coefficient of correlation for each test can be compared in Table 11 with the median obtained in 1948 (although for a larger sample of schools in 1948). At that time the Mathematics Training Test had the highest median biserial coefficient of correlation in predicting survival

*Remmers, H. H. & Gage, N. L. *Student Personnel Studies of the Pharmaceutical Survey.* Monograph No. 3, The Pharmaceutical Survey, 1949.

with the Physical Science Test second and the A.C.E. Psychological Examination total third. In 1950 about the same pattern holds true with the 1950 median biserial coefficient of correlations slightly higher. Moreover, the Pharmacy Background Test is a somewhat better predictor of survival in the average training program than in 1948. The Spearman rank-order correlation between the 1948 and 1950 median biserial coefficients of correlation for the ten predictive variable is .94 representing a high degree of correspondence.

Summary and Conclusions

A follow-up was conducted of the progress and achievement of about 1000 students from all geographical sections of the coun-

TABLE 11

Frequency Distributions of Biserial Coefficiants of Correlation Between the Predictive Tests and Withdrawals from 14 Colleges of Pharmacy*

rbi	PSCHO Total	LOGICAL Q	LOGICAL L	ENGLISH Total	ENGLISH I	ENGLISH II	ENGLISH III	Physical Science	Math	Pharmacy Background
.55-.59					1		1			
.50-.54					0		0	1	2	
.45-.49	1	1	0	1	0	0	0	1	1	1
.40-.44	0	1	0	1	1	0	1	3	4	1
.35-.39	2	0	1	2	3	1	2	4	0	0
.30-34	4	3	3	1	0	1	1	0	2	1
.25-.29	2	2	4	3	4	2	2	2	2	3
.20-.24	3	3	2	2	1	3	1	1	1	2
.15-.19	0	1	1	0	1	2	2	2	1	0
.10-.14	0	2	0	1	0	2	2		1	2
.05-.09	0	1	1	1	1	0	0			1
.00-.04	0		1	0	1	1	1			3
(-.00)-(-.05)	1		0			0				
(-.051)-(-.10)	1		0			1				
(-.101)-(-.15)			1							
(-.151)-(-.20)										
(-.201)-(-.25)				1						
N	14	14	14	13	13	13	13	14	14	14
Median 1950	.30	.25	.26	.27	.28	.20	.25	.38	.35	.23
Median 1948	.31	.26	.30	.27	.27	.17	.21	.31	.33	.14

Rho = .94 (for 1950 versus 1948 median r's across the ten tests).

*One college did not administer the Cooperative English Examination.

try who had enrolled in pharmacy curricula in 1946. The purpose was to test the efficacy of a battery of entrance tests in predicting pharmaceutical training success defined in terms of 1) the Senior Comprehensive Examinations nationally standardized in 1948, 2) grades given by instructors in the various participating institutions, and 3) whether or not a student survived the training program. The data support the following conclusions:

1. The battery of tests administered to entering pharmacy freshmen is substantially predictive of scores on the Senior Comprehensive Examination four years later.

2. There is some indication that within a single institution, the prediction battery may successfully predict to some extent the grades (over-all, pharmaceutical only, non-pharmaceutical only, and senior grades) of students completing the program. It is not possible to provide, however, a national formula for the prediction of such grades, for grading systems from institution to institution, even when they appear to be comparable are, in fact, not comparable.

3. There is some indication that the predictive battery does a better job of predicting non-pharmaceutical than pharmaceutical grades.

4. For many institutions participating in the study, the amount of relationship existing between scores on the Senior Comprehensive Examinations and grades given in corresponding courses is substantial, indicating that grades and the examinations are not mutually exclusive indices of success in pharmaceutical training.

5. The battery of predictive tests used in this and previous studies of The Pharmaceutical Survey, are of value in predicting which students will survive the four-year training period in some institutions and of negligible value in other institutions. The Purdue Mathematics Training Test and the Purdue Physical Science Test have been most successful in predicting survival in pharmacy both after two and after four years of training.

MARRIAGES

Instructor Andrew Long, University of Wyoming, and Miss Mary Margaret Dow of Sheridan, Wyoming, at St. Peters Episcopal Church in Sheridan on December 30, 1950.

"A pharmacist is first of all a highly trained professional man with moral responsibilities, and then a salesman."—Dr. Joseph P. LaRocca, The University of Georgia.

The Rescue of the United States Pharmacopoeia by Organized American Pharmacy in the Eighteen Seventies

GEORGE URDANG

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In the late twenties of the nineteenth century, a group of young and ambitious physicians of Philadelphia, centered around George B. Wood, had wrestled the leadership in the business of the revision of the United States Pharmacopoeia from its New York originators. At the time being, in 1830 and 1831, the result was still uncertain. There were two first revisions (second edition) of the U.S.P., the one issued in 1830 by the New York group led by the old statesman Dr. S. L. Mitchill, the godfather of the original book, the other published in 1831 in Philadelphia and mainly the work of George B. Wood and his friend, Dr. Franklin Bache, a great grandson of Benjamin Franklin.[1]

Then, in 1831, Dr Mitchell died. After his death no one in New York was sufficiently interested to follow up the work done by him and his protegee, Dr. Lyman Spalding, who had died in 1821 only one year after the publication of the first edition. Hence it was the Philadelphian and not the New York book on which the further editions of the United States Pharmacopoeia were based. The success of George B. Wood was for decades practically undisputed. It was well deserved too. Not asked for cooperation in the New York book of 1830, American pharmacy was given its opportunity by the fathers of the Philadelphia pharmacopoeia of 1831 to participate in the work so important to the profession and, in the subsequent editions, to become influential to a steadily growing extent.

*Presented before the joint meeting of the Historical Section of the A.Ph.A. and the American Institute of the History of Pharmacy at Atlantic City, May 1950.

[1] Kremers-Urdang, History of Pharmacy, Philadelphia 1940, pp. 242-247.

I. The Setting of the Stage

There was one difference between the two "second editions" of 1830 and 1831 which proved to be of symptomatic as well as of factual importance. While the New York book (1830) introduced instructive remarks, its Philadelphia rival eliminated even those contained in the edition of 1820. The authors, i.e., George B. Wood and Franklin Bache, considered such definitions and explanations to be "wholly out of place in a pharmacopoeia which is intended for the guidance of those already instructed in medicine and pharmacy, not as a text book for the student."[2] Did that mean, that George B. Wood and Franklin Bache thought the United States Pharmacopoeia so simple a book and (or) its users so well educated that there was no need for comments? The development shows that this was not the case. Only two years after the U.S.P. of 1831 made its appearance Wood and Bache issued the first edition of the United States Dispensatory stating in the preface that the pharmacopoeia "requires an explanatory commentary." From then on, with some interruptions caused through Bache's death (1864) and Wood's infirmary in the seventies of the nineteenth century, the United States Dispensatory appeared simultaneously with (and in larger and more frequent editions than) the pharmacopoeia upon which it was to comment. As a matter of fact, it was the commercial success of the United States Dispensatory which paid the work of Wood and Bache on the pharmacopoeia and kept the latter alive.

It was this reversal of importance between the pharmacopoeia and its commentary, keeping the former on the level of a kind of skeleton to be supplemented by the latter which was one of the reasons for the reform in the pharmacopoeia revision procedure advocated by Dr. E. R. Squibb between 1875 and 1877. It was, however, by no means the only one. When the first United States Pharmacopoeia was conceived, there was no national American Medical Association, but only local societies and colleges scattered all over the country. The success of the new venture was based on the fact that the political principle of representation which had proved its usefulness in the political life of the nation, had been applied in this case likewise and invitations had gone out to all

[2] *Ibidem*, p. 246; U. S. P. 1831, Philadelphia, p. XXIX.

the incorporated colleges and societies of medicine and, since 1850, to the incorporated colleges of pharmacy likewise.

In the meantime, however, things had changed considerably. When Dr. Squibb started his fight for reform in the procedure of revision of the United States Pharmacopoeia, there had been in existence for almost 30 years the American Medical Association, founded in 1847, as the national representative of American Medicine, and for almost twenty-five years the American Pharmaceutical Association, founded in 1852, as the national representative of American pharmacy. It seemed almost natural that some day these national groups had to become the bearers of and responsible for a task which in earlier days, for lack of such nationwide organizations, had to be based on the more or less incidental cooperation of individual local associations and institutions. Questionable only was whether the national groups thought the whole thing important enough to make this rather intricate matter their permanent job.

To make the decision still more unpleasant, there were vested interests of a psychological as well as of a financial nature which stood in the way of every change of the *status quo*. The first one consisted in the hierarchy built up by George B. Wood and his collaborators and followers in Philadelphia, making the preparation of the United States Pharmacopoeia a rather water tight Philadelphia monopoly. The other private interest was concerned with the copyright owned by the publisher of the book whereby the companion of the Pharmacopoeia, the United States Dispensatory, was the moneymaker primarily to be protected. As to the copyright Squibb quoted a legal opinion saying that this was restricted to the one edition only for which it was taken. The claims of the defenders of the Philadelphian monopoly were answered by him with a historical statement showing that the jealousy between Philadelphia and New York that had led to the schism and the two pharmacopoeias of 1930-31 was still smouldering under the ash.[3]

[3]E. R. Squibb: The American Medical Association and the United States Pharmacopoeia. A Reprint of the Pamphlets of Dr. H. C. Wood, Mr. Alfred B. Taylor, The Philadelphia County Medical Society, and the National College of Pharmacy with A Rejoinder addressed to the Professions of Medicine and Pharmacy of the United States, Brooklyn, 1877, p. 143.

"The present plan of making and revising the Pharmacopoeia by a series of decennial Conventions," said Dr. Squibb, "originated in the New York State County, in 1817, and was carried up to the New York State Medical Society, in 1818. By these bodies it was brought before the general medical profession of the country, and by their efforts it was accepted, and carried out to a successful issue, as a measure of general professional interest and value . . . and, therefore, in tracing back the moral right to the plan with reference to the credit, reputation and value of these Conventions as a special plan for a single object, it is found to reside in the general profession as having been made, and carried into successful operation, by the New York County and State Medical Societies. But in 1830, however, as mildly set forth in the 'Historical Introduction' to the revision of that date p. VI, *et seq.* the Conventions and Pharmacopoeia were,—to use the word of the opponents of this movement,—'captured' and taken by the captors to Philadelphia; and from that time to the present, three to five men, keeping up the form of Conventions and Committees to lend authority and weight,—have really controlled and managed the entire interests, admitting outside influences so far as they deemed wise, but no further . . ."

As Squibb stated at another place in the same book[4], the changes in the pharmacopoeia which he had suggested in 1860, as a representative of the Medical Society of the State of New York, and of the Army and Navy, for the fourth revision, and which "seemed to be needed to keep it up to the progress of the times", were "emphatically defeated". In the following Convention, ten years later, he repeated his endeavor and "a majority of The Convention was decidedly in favor of these measures of general progress; but in 1873 it was found that they were again defeated by the Committee of Revision." It was this experience of having no appeal against arbitrary decisions of a delegated group without an authoritative and permanent delegating body which had caused the plan presented by Dr. Squibb to the medical and pharmaceutical professions of his time as represented by the American Medical Association on the one side and the American Pharmaceutical Association on the other.

[4] *Ibidem*, p. 7.

II. Dr. E. R. Squibb's Plan

What then was this plan of Dr. Edward R. Squibb? It asked for cooperative action of the American Medical Association and the American Pharmaceutical Association, "under the fully recognized leadership" of the former,[5] replacing the conventions of old. At the 1876 Philadelphia meeting of the American Medical Association, Squibb suggested that "a provisional plan should be matured and adopted at the meeting of this Association in 1877, and a committee of men familiar with the subject should be appointed to take the provisional plan into consideration, to consult with a similar committee from the American Pharmaceutical Association, and report a complete plan at the meeting of 1878."[5]

The whole management and control of the Pharmacopoeia was, according to Squibb, to "be entrusted to a sub-organization [of the American Medical Association] . . . to be called The Pharmacopoeial Council of The American Medical Association." Squibb wanted a book embracing "a Dispensatory or its equivalent in the Pharmacopoeia itself" instead of "a mere outline or skeleton, requiring the Dispensatory as a commentary"[6] and he wanted it to be edited by a small committee under the leadership of a paid editor and in intervals of five instead of ten years with an annual semi-official "fasciculus or small inexpensive volume," containing information about new remedies, innovations, etc.

Dr. Squibb was respectfully listened to and his preamble and resolutions adopted asking as they did for nothing but due deliberation of his plan and that the subject be recommended to the President of the Association for consideration in his annual address for 1877. The matter was made "the order of business for 10 o'clock on the second day of the next annual meeting of the Association, and Dr. Squibb was directed to be present and present the subject of discussion at that time."[7]

The general impression was that the plan had been favorably received and it was with this in mind that Dr. Squibb tried to make his ideas palatable to the members of the American Pharmaceutical Association gathering a few months later likewise in Phila-

[5] *Ibidem*, p. 15.
[6] Proc. Am. Pharm. Assoc., 24: 632, 1876.
[7] E. R. Squibb:, *op. cit.* p. 17.

delphia. In contrast to their medical colleagues, the pharmacists did not content themselves with listening and postponing the discussion to a later date. The audience was unanimously of the opinion that "the medical profession, certainly have a right to direct what substances shall enter into the Pharmacopoeia, their general character, and the preparations, but the details of the work devolve certainly upon pharmacists and pharmaceutical chemists. . . ."[8] The same tenor was expressed in a meeting of the New York College of Pharmacy held some months later.[9]

In the meantime the adversaries of the Squibb plan did not remain idle. The main argumentation against it came, naturally, from Philadelphia, especially from George B. Wood's nephew, Dr. Horatio C. Wood, and, very well expressed and building up fear of a monopoly on the part of organized medicine, from the eminent Philadelphia pharmacist, Alfred B. Taylor. In general there was little response from the medical profession at large. Did that mean lack of interest in the question of a national American pharmacopoeia? It did. It was at the Chicago meeting of the American Medical Association, in June 1877, that Dr. Squibb experienced his Damascus.

III. Rejection by the American Medical Association

It has to be said that the then President of the American Medical Association, Dr. Henry I. Bowditch of Massachusetts, a man of high scientific as well as social stature, discharged the duty of dealing with the matter in question in his presidential address of June 5, 1877, imposed upon him by the resolution of the Philadelphia 1876 meeting, in all fairness and in considerable detail.[10] But his attitude towards the plan to make the Pharmacopoeia the responsibility of the American Medical Association, with the American Pharmaceutical Association as a statutory (although subordinate) collaborator, was obviously negative. The statement that "this association has never taken any action relative to them [the Pharmacopoeial Convention]" was made by Dr. Bowditch with some kind of relief rather than of regret, and he certainly expressed the opinion of the majority of the American physicians of his time when he mentioned the Dispensatory and not

[8]Proc. Am. Pharm. Assoc. 24:636, 1876.
[9]E. R. Squibb: *op. cit.* pp. 25-37.
[10]The Transaction of the Am. Med. Assoc., XXVIII: 109-114

the Pharmacopoeia as the work "which every physician in the country needs and uses perhaps daily", and dismissed the objections and suggestions of those advocating an active and responsible part of the American Medical Association in the preparation of the United States Pharmacopoeia as follows:

"But these objections and suggestions refer, of course, merely to the Pharmacopoeia. To the Dispensatory they cannot be applied. That is a private and very remunerative work, most valuable to the profession—more valuable than any pharmacopoeia, unless we very materially modify the present form and character of the latter work. I can readily conceive of the two books being combined, and indeed that would seem to some a very desirable object. But the question is whether that can be done at present in this country. The Dispensatory, even if it does not always correspond with the Pharmacopoeia, is exceedingly valuable to those who publish it under a copyright. The editors are already preparing to bring it up to the highest standard under the direction of two of our ablest physicians [the old and ailing George B. Wood and his nephew, Horatio C. Wood]. That copyright runs, I believe, several years longer. I hardly fancy that, at present, any one could ask the venerable proprietor to forego the advantages which have accrued and will accrue to him for many years from the great sale annually made of that work, and upon which he has expended so much intellectual labor during so many years, and greatly to the profit of the whole profession."[11]

There was, besides the plan of Dr. Squibb, another suggestion for a change in the Pharmacopoeial revision procedure submitted to President Bowditch by the Chicago College of Pharmacy. It advocated a convention of two committees, a medical and a pharmaceutical one, the physicians determining "what remedies should be used" and in what form and the pharmacists to make "the formulas and direct the processes for all preparations named by the Committee of physicians". In referring to this suggestion, Dr. Bowditch made the following striking statement:

"The object of these suggestions is obviously to give to physicians the right to say what the remedies shall be, which the pharmacist will prepare. One objection to this plan is this, that most of our modern preparations are made by druggists alone, and subsequently used by physicians. It would not, therefore, as I think, be well to try to limit the druggists in the preparation of their remedies under the direction of any single committee of physicians. If we did it, even if we could do so, I fear we should lose many new and valuable preparations now frequently sent forth by druggists, which can never be objected to,

[11] *Ibidem*, pp. 112, 113.

provided the physician knows, while prescribing, the quantity and quality of each medicine given in any particular formula."[12]

This statement meant full power of attorney to the drug industry with organized medicine refusing to take any responsible part in the matter as a whole, and only reserving personal evaluation and action of the individual practitioner.

At the end of his report Dr. Bowditch recommended "that a committee be appointed at this meeting to consider every matter connected with the Pharmacopoeia. Said Committee should communicate with the officers of the convention, that is to be held in 1880, with the publishers of the Dispensatory and Pharmacopoeia, with the American Pharmaceutical Association, and with any others interested in the subject, and report the result of such inquiry to this Association, at its next annual meeting, with resolutions for any action on our part which may be deemed appropriate."

This recommendation, heaping the difficulties without showing much to be gained even if they could be overcome, was given half-heartedly and was received as such by an audience that felt bored and unduly bothered. Even before Dr Squibb was given an opportunity to explain and defend his plan, the report of the Special Committee on the President's Address was pronounced. It refused the recommendation of the President to follow up the matter. "On the question of the Pharmacopoeia", the report said, "we deem it inexpedient at the present time to take any action in the premises."[13] Hence Dr. Squibb was a defeated man before he started his plea and his stubborness in forcing the assembly to listen for hours to a presentation nobody wanted to hear did not help his cause. The following extract from the Transactions speaks for itself:

"The hour of ten having arrived, the President announced as the special subject, the consideration of the revision of the Pharmacopoeia, and Dr. E. R. Squibb, of New York, took the stand, and read a paper reviewing the whole subject.

"A motion to suspend the reading, and lay the whole subject on the table was lost.

"Dr. Squibb continued to read.

"On motion of Dr. T. J. Gallaher, of Pennsylvania, permission was given to Dr. Squibb to read until 11 o'clock.

"Dr. Squibb continued to read his manuscript.

[12] *Ibidem*, p. 112.
[13] *Ibidem*, p. 36.

"After some time, the hours for other business having arrived, on motion of Dr. Gallaher the matter was referred to the Committee of Arrangements, to select an hour for its continuance."[14]

It was decided that Dr. Squibb should be permitted to continue the next day, "being required to finish his remarks in twenty minutes and the remainder of the session be given to those entertaining opposite views."[15]

The next day Dr. Squibb took up his topic once more, again overstepping the time allotted to him and again allowed additional time.[16] There was not much discussion. "Dr. H. C. Wood, of Pennsylvania, took the floor and made some remarks in opposition to the plan of Dr. Squibb. Dr. S. Lilly, of New Jersey, read a protest of the State Medical Society of New Jersey, against the continuance of the old plan." A motion by Dr. Brodie, of Michigan, to have the question reconsidered by a committee of five was withdrawn after some remarks by Dr. S. N. Davis, of Illinois. A motion by the latter "that the whole subject be indefinitely postponed . . . was carried by a large majority." The very last word was spoken in the final "Report of the Special Committee on the Recommendations contained in the annual address of the President of the Association, delivered in Chicago, June 1877" reading as to the subject under consideration as follows: "So much of the recommendations made in the address of Ex-President Bowditch as related to the revision of the United States Pharmacopoeia was definitely disposed of by the action of the Association at its last annual meeting."[17] That was, with regard to the acceptance by the American Medical Association of Dr. Squibb's plan of making the United States Pharmacopoeia the task and responsibility of the national body of American medicine, a poor man's funeral.

IV. The American Pharmaceutical Association Takes Over

Exactly three months later, on September 6, 1877, this funeral was followed by a glorious resurrection. It was in fulfillment of the promise given to the members of the American Pharmaceutical Association in 1876 to reappear at the 1877 annual meeting and to report on the progress of his plan, that Dr. E. R. Squibb stood

[14] *Ibidem*, p. 36.
[15] *Ibidem*, p. 37.
[16] *Ibidem*, p. 40.
[17] The Transactions of the Am. Med. Assoc., 29: 48, 1878.

before the pharmacists who had gathered this time at Toronto. He stated his defeat humbly and with dignity. He said:

"So far as I am concerned in the unfinished business, that is handed down from last year and now called up by the Business Committee, there is nothing to be done. The design and plan with which that was presented to the Association last year has been entirely, and I was going to say ignominiously, defeated. . . . The American Medical Association has distinctly refused to have anything to do with the subject. . . . It was brought up here with the supposition that the American Medical Association would not take the action which it has done. Now, how far the object which we all have in view—both the American Medical Association and this Association—how far the object of obtaining a better Pharmacopoeia is concerned, must be a matter of individual opinion. . . ."[18]

The statement of Dr. Squibb gave rise to a spontaneous and unanimously adopted resolution saying "that while there may be, among the members of the American Pharmaceutical Association, an honest difference of opinion as to the advisability of the plan suggested by Dr. Squibb, the thanks of this Association be and hereby are tendered to Dr. E. R. Squibb, of Brooklyn, N. Y., for his earnest efforts, during the past two or three years, to inaugurate an improvement in the plan of the revision of the United States Pharmacopoeia"[19]

This tender prelude was followed by a rather dramatic recitation. It was the German born and educated New York pharmacist, author, and journalist, Frederick Hoffman, who posed the question: What now?

After briefly deliberating on the lack of understanding for the value of a Pharmacopoeia on the part of the physicians, Mr. Hoffman stated:

"Does it not, under such circumstances, and in view of the striking lack of interest of the American Medical Association, and evidently of the medical profession in general, in pharmacopoeial revision, seem doubtful if the profession of medicine, at the decennial meeting of the Pharmacopoeial Convention in 1880, will be represented at all? And if so, the question may arise whether a sporadic representation by a comparatively small number of medical schools and local societies, as has been the use in the past, can be regarded as commensurate with the importance of the subject, the status of American medicine, and the extent of the country.

[18] Proc. Am. Pharm. Asso., 25: 531, 1877.
[19] *Ibidem*, p. 532.

". . . Now, since the profession of medicine, through its national representative body, has distinctly declined any share in the work of pharmacopoeial revision, will not this finally fall to the lot of pharmacy? And furthermore, when it comes to real work, will not all so-called representation henceforth, as in the past, have to yield to talent and skill and leave the labor to a few competent and experienced experts, irrespectively of their special occupations? . . ."

Hoffman finally put the rhetorical question, whether not the time has arrived "when this Association as the foremost exponent of American pharmacy, and as the proper and competent custodian of the interests and status of both the profession and the Pharmacopoeia, is entitled and in duty bound to vindicate its prerogative . . . in both the labor and the management of the pharmacopoeia." He answered this question in the affirmative by offering a resolution whose most important passages read as follows:

"Whereas, The American Medical Association, after a full and elaborate presentation of this subject, and of a mature plan for action, at its recent meeting in Detroit [Chicago] has signally failed to evince due interest in or any willingness for co-operation in the important subject of pharmacopoeial revision, by indefinitely postponing the proposed project; therefore

"Resolved, That the President of this Association appoint a committee of five to take into consideration the advisability and feasibility on the part of the American Pharmaceutical Association, as the national representative organization of the profession of pharmacy, to prepare a complete Pharmacopoeia, which may be submitted to the criticisms of the medical and pharmaceutical professions, and may be proposed to the final Committee of Revision and that that Committee be instructed to report early at the next session, so as to leave time for definite action at this meeting."[20]

There were objections against criticizing the attitude of the American Medical Association in the preamble of the resolution, and the respective passage was slightly changed omitting everything derogative. There was no objection, however, against the real issue, the suggestion of considering "the advisability and feasibility . . . on the part of the American Pharmaceutical Association . . . to prepare a complete Pharmacopoeia." The Philadelphians Joseph Remington, Charles Bullock and John Maisch joined with the New Yorkers Henry J. Menninger, Frederick Hoffman, P. W. Bedford and Charles Rice, the Bostonian S. A. D. Sheppard,

[20] *Ibidem*, p. 534.

the Chicagoan A. E. Ebert and all the others in attendance, and the modified preamble and the undiluted resolution were carried.

Further action followed at the same meeting. It was proposed and resolved, that "this Association appoint a Committee on the Revision of the United States Pharmacopoeia, consisting of fifteen members, who shall by a plan to be determined by themselves, be instructed to prepare the text of the proposed new Pharmacopoeia, and that they report progress at each subsequent meeting, and finally lay before the Association, at its meeting in 1879, a complete result of their labors."[21]

Was not trouble to be expected by those who felt themselves deprived of, or at least restricted in, their old privileges? President Charles Bullock in his address delivered on September 4, 1877 had intimated how that could be avoided. "If we exclude from consideration," he said, "a change in the copyright of the book and continue it in the hands of the convention especially charged with this work alone, the modifications recommended in the revision can be carried into effect . . ." It was this means of expediency which proved to be a success. The old "convention" remained externally untouched, and the office of president was filled by a physician, as had been the case since 1820. The question whether there was a possibility of a rejection by the National Convention of "a complete Pharmacopoeia" proposed by the American Pharmaceutical Association was answered by Remington in the affirmative. But, he said, "it is hardly likely that those who form the National Convention, the physicians and medical colleges, would throw overboard the Pharmacopoeia as revised by the American Pharmaceutical Association, which has received the sanction of the various colleges, who are also represented in the National Convention . . ."[22]

The year after, in 1878, a report of the committee of fifteen, the product mainly of the "energy and wonderful talent of organizing possessed by Mr. Rice,"[23] was accepted at the Atlanta meeting of the American Pharmaceutical Association in 1878. Another four years later, in 1882, a Pharmacopoeia appeared perfectly up to date and worth all the trouble. American Pharmacy had come to the rescue of the United States Pharmacopoeia

[21] *Ibidem*, p. 554.
[22] *Ibidem*, p. 556.
[23] Proc. Am. Pharm. Assoc. 26:879, 1878.

at a moment of dissolution, and it has continued the job of safeguarding the continuity and adequacy of the work to be done ever since. Stabilizing by the founding, in 1900, of "The United States Pharmacopoeial Convention" what it, in 1877, had captured in meeting an immediate need, it has thrown the doors wide open to every kind of co-operation and has erected an edifice which seems strong enough to weather whatever storms may try to shake it.

NOTICE!!!

The Cumulative Index for the first thirteen volumes of The American Journal of Pharmaceutical Education was published as Monograph Number 5, American Council on Education, and as a supplement to The Journal.

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The National Education Association has asked **The Journal** to call attention to the tours that are conducted each summer which have great educational value. This project has been carried on for the last five years and will be greatly extended the coming summer. This year they will cover Alaska, the Atlantic Seaboard, the Canadian Rockies-Pacific Northwest, Central America, Cuba, Europe, French Canada, Hawaii, Mexico, the Pacific Northwest-California, the Rockies, California-Southwest, and the Western National Parks. A booklet has been prepared giving something of the background of the country or areas covered by each tour and the cost of each tour and the needs of travel. The booklet and more detailed information may be obtained by addressing the Division of Travel Service, National Education Association, 1201 Sixteenth Street, N.W., Washington 6, D. C.

Science in American Pharmaceutical Education of the 19th Century

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I. A Small Mould Cast (—1820)

As bustling America moved into the 19th century it was only the occasional apothecary whose path touched that of science. Why pharmacy and science could not meet on common ground in the United States until relatively late finds explanation as much in what had gone on before as in the men and events that were to fashion formal pharmaceutical education during the century.

For the broad strata of middle-class occupations, including pharmacy, the educational basis lay neither in the early colleges nor in trade schools. It lay rather in the relation of apprentice to master, a basic concept of vocational education brought over by the colonists (especially from England). Under pioneer conditions this empirical pattern of training became imbedded in American utilitarianism and persisted much longer and covered a broader occupational area than might be expected.

Science teaching had begun in the eight colleges already established by 1780 as general institutions of higher learning. But science remained largely an avocation for gentlemen. Few except those entering the clergy and the children of the wealthy could think in terms of collegiate training before well into the 19th century.[1]

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[1]For discussions of American science and science teaching in the early period see Theodore Hornberger, *Scientific Thought in the American Colleges, 1638-1800*, (University of Texas Press, Austin, 1945); and Dirk J. Struik, *Yankee Science in the Making*, (Little, Brown and Co., Boston, 1948).

During the 18th century, education for both pharmacy and medicine was sought almost entirely within the general preceptor system. Glorification of unrestricted liberty and of the self-made man meant that Americans drifted into and out of the practice of medicine and pharmacy, much as in any trade. Under such conditions the two professions had reverted to a more primitive cultural stage in which both services were usually merged in a single individual. Reversion of pharmacy and medicine to a completely empirical level was prevented mainly by the more or less scientific background of practitioners here and there who had been educated in Europe. Undoubtedly such men inculcated their apprentices with rudiments of the science and theory underpinning medical services. But it is safe to assume that such knowledge was attenuated by serial dilution as successive generations of apprentices served as masters for the next.

This system of preceptorship dominated pharmacy and medicine (and law as well) long after the industrial revolution brought the decline of the system in industry.[2]

At the beginning of the 19th century medical students who elected to take a "college" education studied for as long as three months, supplemented by about three years of apprenticeship.[3] The calling of pharmacy at this time was being staffed by apprentices who had served with an apothecary (or with a physician who dispensed his own drugs) and by physicians themselves, who still often kept drug shops as part of their vocation. To most of those active in pharmacy, and to the majority of physicians, early 19th century pharmacy was a trade, or "an art which did not require theoretical knowledge."[4] The minimum functional needs required for material success did not include science; and hence, within the middle-class scheme of values of the time, it was not easy for the idea of scientific study to take root in pharmacy.

In this atmosphere nothing much came of attempts to offer some formal instruction in pharmacy and its underlying theory. In 1812, James Cutbush, self-styled apothecary and an excellent

[2]Paul Monroe, *Founding of the American Public School System*, (Macmillan, New York, 1940), 35.
[3]Henry Burnell Shafer, *The American Medical Profession 1783-1850*, (Columbia University Press, New York, 1936), 34.
[4]Edward Kremers and George Urdang, *History of Pharmacy*, (J. B. Lippincott Co., Philadelphia, 1940), 204.

chemist, gave a series of "Lectures on the Theory and Practice of Pharmacy" in Philadelphia. It is not known how long these were given or who attended, but it is significant that the venture was started upon "the solicitation of several medical gentlemen."[5] In 1816 Dr. James Mease, a Philadelphia physician, applied to the University of Pennsylvania for permission to conduct a course in pharmacy but the fate of the venture is uncertain.[6]

If there was so little interest in professional or scientific instruction in the Quaker City, the cultural and scientific center of the country, the dominant pharmaceutical attitudes elsewhere may be imagined. Merchants handling drugs as a sideline, or other uneducated men calling themselves druggists, could see such educational aspirations as little more than an undermining of their own position.[7] It was only through the increasing number of pharmaceutical specialists (some educated in pharmacy abroad) that cultural changes in the United States could stimulate a noticeable response in pharmacy. So far, such men had been isolated and individual practitioners, not a professionalized group. Then, in Philadelphia there came a challenge when a group of physicians proposed inaugurating instruction for apothecaries within the frame of medical education at the University of Pennsylvania. This crystallized isolated pharmacists into the first cooperative group, the Philadelphia College of Apothecaries, in defense of their independence and in furtherance of pharmacy as a separate professional specialty. The existence of this association or "College" offered the possibility of beginning conversion of pharmaceutical instruction in the United States from a primarily empirical basis to a scientific basis.[8]

[5] As quoted by H. George Wolfe, "James Cutbush—Author, Teacher, Apothecary General," in *American Journal of Pharmaceutical Education*, 12: 96, 1948.

[6] LaWall and Wilbert express opposite opinions concerning the outcome of the proposal. Wilbert believes that the University of Pennsylvania cooperated fully with Mease, to the extent that for several years pharmacy students took a "comprehensive course of study along the lines followed in Universities of Continental Europe," combining a study of natural sciences with pharmacy. (M. I. Wilbert, "The Pharmaceutical Exhibition in Philadelphia," in *American Journal of Pharmacy*, 88: 449, 1916). Of the same episode LaWall wrote five years later in the same journal that it is probable no one ever took the course "for no further mention was ever made of it." (Charles H. LaWall, "The Founding of the Philadelphia College of Pharmacy and Science," in *Am. J. Pharm.*, 93: 171, 1921). Kremers and Urdang seem to favor the latter version (*History of Pharmacy*, 204). The question is only obliquely relevant here, but is being investigated in detail in connection with a larger, more general historical study of American pharmaceutical education.

[7] Daniel B. Smith, "Address Delivered to the Graduates of the Philadelphia College of Pharmacy," in *Am. J. Pharm.*, 9: 97, 1837.

[8] For a discussion of the circumstances of the founding of the Philadelphia College of Apothecaries, which a year later became the Philadelphia College of Pharmacy, see Kremers and Urdang, *History of Pharmacy*, 173 ff.

II. "Store" Science (1821-1867)

Only a foggy boundary lay between American medicine and pharmacy still in 1821. Of those who had come to specialize in the practice of medicine the average man probably was scarcely better educated than men in pharmacy who took their calling seriously. Up to the 19th century only 312 medical students in the United States had taken the short lecture courses necessary for a "college degree."[1] But in the cultural centers, medicine—unlike pharmacy—was beginning to evolve a professional structure. It is thus not surprising that in Boston as well as Philadelphia a stimulus for improving the qualifications of apothecaries came from physicians. In both cities during the 1820's this precipitated a number of apothecaries and wholesale druggists into cooperating groups, or "colleges." Five other local associations were born before the end of the Civil War; some included organized instruction for apprentices in their program.[2]

Besides the stimulus from medicine, these beginnings were also conditioned by a growing popular interest in education and in science particularly, which gained momentum in the 1820's with the lyceum movement. In urban centers popular science lectures were being delivered in crowded auditoriums by itinerant speakers.[3]

"The common schools were in poor shape, and had deteriorated seriously in the last decades, since the well-to-do had been sending their children to private institutions. At the same time the interest of the people in education and self-improvement had grown by leaps and bounds. There were popular lectures everywhere, discussions on popular science and on literature, accompanied by a demand for informative books. [Johiah] Holbrook [leader of the lyceum movement], like [Amos] Eaton, was a beloved traveling lecturer, and was keenly aware of the new trend expressed through this grass-root curiosity. . . . For the lyceum movement Holbrook constructed apparatus to promote the teaching of science, a relative novelty which even today might be more widely emulated. . ."[4]

"Many lecture courses lasted several weeks; some had enormous attendance. Benjamin Silliman, then at the peak of his fame as a lecturer, opened the [Lowell] Institute in 1839 with a series on geology. When tickets were given out for his second course, on chemistry, the

[1]William Frederick Norwood, *Medical Education in the United States Before the Civil War*, (University of Pennsylvania Press, Philadelphia, 1944), 430.
[2]See Kremers and Urdang, *History of Pharmacy*, chapters 12 and 14, for details on the early associations and general educational aspects.
[3]Struik, *Yankee Science*, 202-216.
[4]*Ibid.*, 207 f.

crowd filled the streets adjacent to the lecture hall . . . The number of applicants for a single course sometimes rose as high as 8000 or 10,000, so that tickets were distributed by lot . . . interest lay overwhelmingly in science . . . In the outlying towns reports on the progress of science were received with the same ardent expectation."[5]

Utilitarianism led Americans to grasp applied science during the subsequent decades as a tool in the practical affairs of life and in exploiting untapped natural resources.[6] Since pharmacy is traditionally rooted in applied science why did the scientific level of pharmaceutical instruction lag in the United States throughout most of this period?

A major limitation was that the pharmacy courses given until after the Civil War did not arise within established institutions of higher learning, but rather as independent enterprises.[7] This meant a vest pocket type of school with uncertain finances and consisting of lecture series in rented rooms.

Moreover, much educational effort was expended in establishing at least a foothold for professionalism in American pharmacy, rather than in elaborating the scientific content of the courses. Even after the Civil War a similar circumstance was reflected in the appeal of Prof. Edward Parrish of the Philadelphia College of Pharmacy to the American Pharmaceutical Association, who said:

"In none of the cities but New York, Philadelphia, Baltimore and St. Louis are there any colleges attempting to get along and keep up the instruction. I don't know that we could do anything, but I think the weight and influence of this Association should be thrown in this direction."[8]

Under such circumstances it would have been difficult if not impossible to impose academic entrance requirements. Without them such scientific instruction as was given had to be rudimentary. The centennial histories of the Philadelphia and New York colleges, the two strongest teaching centers during this period, are significantly silent on the question of admission standards.[9] Whatever the ordinary preliminary preparation may have been,

[5] *Ibid.*, 211-213.
[6] For an excellent analysis of this situation and the factors involved, see Richard H. Shryock, "American Indifference to Basic Science During the Nineteenth Century," in *Archives Internationales d'Histoire des Sciences*, 1948, 50-65.
[7] With one possible but inconsequential exception: Tulane.
[8] Edward Parrish, in *Proceedings American Pharmaceutical Association*, 14: 39, 1866.
[9] Curt P. Wimmer, *The College of Pharmacy of the City of New York—A History*, (New York, 1929); Joseph W. England, ed., *The First Century of the Philadelphia College of Pharmacy*, (Philadelphia, 1922).

there is no reason to believe that pharmacy students were better prepared than medical students. And in the 1830's the intellectual equipment of many prospective physicians, declared Benjamin Lincoln, a zealous contemporary critic, was comprehended in an ability to "read, write and cypher."[10] He maintained that "illiterate men in great numbers, (and in some (not very rare) cases, grossly and criminally ignorant men)—do enter the Profession of Medicine." Norwood, who has written the only comprehensive history of American medical education before the Civil War, states that the conditions Lincoln described, while "possible exaggerated, lived on until the advent of the American Medical Association, which was only gradually able to improve the situation."[11]

Feeding into the situation restricting scientific work and study in middle-class professions generally was the fact that general adoption of the public school system came only with the 19th century. Thus only a few from the upper economic strata had the time or money to spend on preliminary education before beginning an apprenticeship, and perhaps finally enrolling in a professional lecture course.

By mid-century probably the average young man had taken advantage of public grammar school education. Beyond that, public high school education was available only in the larger cities. But during the 1850's the number of high schools rose from a few dozen to some 300. Of course on the Western frontier—now pushed as far as Iowa and Missouri—education was even more of a luxury. "In 1850 only a few schools were available in the West and terms were often three months or less."[12]

Without keeping in mind the student's very limited preliminary preparation, a distorted picture of the level of instruction may well result from examining the curriculum of the professional lecture courses.[13]

[10]Quoted by Norwood, *Medical Education*, 221 f.
[11]Norwood, *Medical Education*, 221 f.
[12]Arthur C. Cole, *The Irrepressible Conflict, 1850-1865*, (Macmillan, New York, 1934), 205, 208.
[13]It was also relatively late before the science schools connected with well-known colleges installed any substantial entrance requirements. At the Yale Scientific School,, for example, "up to 1860 there was no real examination for admission. Anybody, no matter how ignorant, could join the chemical department . . ." Conditions at the Harvard scientific school were similar (Charles W. Eliot, "The New Education—Its Organization," the *Atlantic Monthly*, XXIII: part I, 209, 1869).

In commenting on this situation, Charles W. Eliott said: "The term 'learned profession' is getting to have a sarcastic flavor. Only a very small proportion of lawyers, doctors and ministers, the country over, are Bachelors' of Arts. The degrees of LL.B. and M.D. stand, on the average, for decidedly less culture than the degree of A.B. . . . the word 'learned' can only be conventionally applied to professions for which the preliminary training exacted is so short and loose" (*Ibid.*, 215).

For several decades the instruction offered by early "colleges" of pharmacy followed a standardized pattern, embracing chemistry, pharmacy and materia medica. Of the three basic sciences—physics, chemistry and biology—only "chemistry appears to have been recognized as of sufficient importance to be given a distinct place in the curriculum."[14] About the course arranged by the New York College, George C. Close, an apothecary and student, said: "Our Professor in Chemistry was Dr. John Torrey, who also gave us some instruction in Botany . . . In his lectures, the subject of electricity was fully illustrated by means of a large machine and plenty of Leyden jars, as well as by powerful galvanic batteries. Water was decomposed, metals were burned, mixtures of hydrogen and air exploded in bladders placed around the room and various other striking and amusing experiments were performed with the air pump and otherwise."[15]

This emphasis on chemistry as the scientific core of an American profession of pharmacy gained early dominance. In this, European pharmacists no doubt served as a model. They had—particularly in France and Germany—"helped to transform diffuse chemical knowledge into that systematical arrangement of facts which we call science today, by writing the first and best real chemical textbooks." A list of such pharmacist-authors would include in France Nicaise LeFebvre, Christoph Glaser (a Swiss living in France), Nicolas Lemery, and in Germany most notably Caspar Neumann. These men of the 17th and early 18th century were at the same time lecturers, and later on in the 18th and 19th centuries such pharmacist-chemists became professors of chemistry at the universities. In Germany these included men of the caliber of J. P. Spielmann, Ph. L. Geiger and K. G. Hagen.[16]

"In the [European] profession of pharmacy, the young science of chemistry found the place, the equipment, the men and readiness necessary for its cultivation,"[17] George Urdang has pointed out.

Hence it is not surprising that when aspiring American apothecaries thought of science they thought, mainly, in terms of chem-

[14]Edward Kremers, "The Teaching of Pharmacy During the Past Fifty Years," in *Druggists Circular*, 51: 61, 1907.
[15]Quoted by Wimmer, *The College of Pharmacy*, 28.
[16]George Urdang, *Pharmacy's Part in Society*, (American Institute of the History of Pharmacy, Madison, Wisconsin, 1946) 24 f.
[17]*Ibid.*, 24.

istry, rather than the more traditional botanical study. This focus was sharpened further by interest in the revolutionary "new French chemistry," based on the work of Lavoisier.

Men who had grown into the role of apothecary on American soil did not share, as mentioned previously, this scientific tradition. But those who wanted to professionalize the calling in the United States—whether they had entered pharmacy here or abroad—saw chemistry as a mainstay of the scientific, the ideal, pharmacist. During most of the 19th century in this country, however, chemistry did not come from pharmacy; instead it was necessary for chemistry, and the chemistry teachers, to come *to* pharmacy. As pointed out in a later connection, these teachers often were physicians or at least trained in medical schools.[18]

Hence, when the physician and former chemistry professor, Dr. John Redman Coxe, in consultation with 16 apothecaries, drew up a plan for the proposed instruction at the University of Pennsylvania, the objective was to assure for American pharmacy its place as a science, to be achieved mainly through chemistry. Although this particular plan never became consequential, because of the independent counter-action leading to the founding of the Philadelphia College of Apothecaries, the goals as seen by Coxe and those he consulted significantly show what was considered important and possible.

He saw pharmacy as "a branch of the science of medicine," mainly concerned with preparing the materia medica; and "an intimate acquaintance with chemistry can scarcely be considered as not being absolutely essential to the apothecary." Moreover, it was felt to be "of the greatest importance to society that he should be perfectly grounded both in the theoretical and practical part of the art he professes." Dr. Coxe recognized that "Pharmacy has been divided into theoretical and practical—the first consisting not merely of speculative opinions, but of a knowledge of facts and principles tending to explain the rationale of processes—the latter comprehending the mere manual labor employed in those processes.

[18]For a discussion of the M.D. in pharmacy and, from a somewhat different angle of vision, of the differences between continental Europe and the Anglo-Saxon world, see George Urdang, "The Part of Doctors of Medicine in Pharmaceutical Education," *Ameri. J. Pharm. Edu.*, 14; 546-555, 1950.

"The former of these may, therefore, be justly styled scientific pharmacy, which is equally essential to the physician and to the apothecary. It is, as before affirmed, closely connected with chemistry, inasmuch as it is founded on the principles of the science and can in no wise be separate therefrom. It establishes beyond a doubt the necessity of chemistry to the physician and evinces clearly that he cannot be deficient in it without being correspondingly defective in his practical pursuits."[19] This was all the more the case since the materia medica of old had still not found its modern scientific basis, transforming it into pharmacology, and the pharmaceutical science of pharmacognosy was still not born.

Except for isolated apothecaries the tradesmen filling pharmaceutical functions after their fashion, for much of America, were not ready to go very far toward the scientific goal set by men like Dr. Coxe. Yet, of all the sciences a skill and understanding of chemistry was most functional in the daily practice of pharmacy. Hence, in the teaching and in the textbooks, as will be noted later, it is chemistry that holds an important place and is the first and for a long time the only science to be seriously studied from a theoretical point of view in American pharmacy schools.

Thus a St. Louis pharmacist, in a letter to the editor, could refer to pharmacy in 1858 as "a branch of Chemistry" (not of medicine); and in counseling prospective students he cautioned that this "science ought to be thoroughly known . . ."; "pharmaceutical botany ought to be understood also; though Mineralogy is not so important, still it would be better to have some knowledge of this science."[20] No doubt this gives some insight into what a competent pharmacist of that time considered important and possible in the way of a formal education for apprentices. A few years later the *American Journal of Pharmacy* chose a similar emphasis with regard to study, stressing that the student "is not afraid to strike out into the obscure or unknown where he has chemistry as his guide and friend."[21]

[19]The full text of the statement was reprinted by England, *The First Century*, 45 f.
[20]"Athanor," letter to the "Junior Department," in *American Druggists Circular and Chemical Gazette*, 2: 128, 1858.
[21][William Procter, Jr.], "Editorial Department," in *Amer. J. Pharm.*, 33: 476, 1861.

Besides chemistry, a second series of lectures was devoted to materia medica and pharmacy, which customarily were taught together during this period. The course was a catch-all, which "embraced everything relating to remedies used in the treatment or prevention of disease."[22] As such it could have little scientific content, in the sense of the theoretic and systematic study of natural phenomena relating to the various phases of pharmacy.

On this point, the discussion here concerning science in pharmaceutical teaching follows the concept expressed by Prof. Theophilus Redwood when he told 19th century British students of pharmacy that they were expected to study "botany and materia medica, chemistry and pharmacy . . . two belong to the class of sciences, and the other two are not entitled to that distinction. Materia medica and pharmacy are merely departments of art appertaining to the selection and preparation of medicines."[23]

In the materia medica lectures before mid-century, undoubtedly botany received occasional but cursory treatment. Still in 1856 William Procter, Jr. could say that "None of the American Schools of Pharmacy have regular courses on botany, as far as we know, yet the rudiments are generally explained by the teachers of materia medica." It was understood that not many apprentices would enter a school anyway, but Procter told members of the American Pharmaceutical Association that he believed "apothecaries would be the gainers by encouraging their apprentices to cultivate a taste for this science . . ."[24]

By 1848 the New York College was offering some instruction in "practical botany." Ten years later systematic botany is said to have been added, although school catalogs in the 1870's still described botany instruction as part of the materia medica course.[25]

[22] J. Hampton Hoch, "A Survey of the Development of Materia Medica in American Schools and Colleges of Pharmacy from 1821 to 1900," in *Am. J. Pharm. Edu.*, 12: 149, 1948.

[23] Theophilus Redwood, "Pharmaceutical Study," in *Am. J. Pharm.*, 58: 44, 1886. The editor of the Philadelphia journal indicated that Prof. Redwood's address "in most respects, applies also to pharmaceutical study in the United States."

[24] William Procter, Jr., et al. [Report of the Committee on Textbooks], in *Amer. J. Pharm.*, 28: 493, 1856.

[25] Henry H. Rusby, *The College of Pharmacy of the City of New York*, (New York, n.d.), appendix. Practical botany was offered as early as 1841, according to Rusby, but this course probably was abandoned (along with proposed optional summer lectures in toxicology and medical jurisprudence) when the College was dispossessed of its quarters. (During the following summer a half dozen students took an optional course that included 12 lectures on poisons, 6 on physiology and 6 on botany.) Although regular instruction in "practical botany" began in 1848, it was optional. After two years, enrollment in this course dropped to zero; thereafter (1850), it is said to have been required of students who wished a diploma. (Wimmer, *The College of Pharmacy*, 44-48.)

At the Philadelphia College botany was given recognition as part of a course title in 1867 when John Maisch assumed the chair in materia medica. ". . . Because of his personal qualifications for such teaching the chair was enlarged to comprehend the subject of botany."[26]

Besides the restricted curriculum and the average student's lack of preliminary education, the scientific content of such courses was further self-limited by the short period of attendance. Classes customarily met three evenings a week for three to four months.[27] Following the pattern established in medicine, the student repeated the same lecture courses in the second year. A diploma was then granted when the student had completed a four-year apprenticeship with "a respectable druggist or apothecary."[28]

And at least until the Civil War perhaps not more than one in twenty of those entering pharmacy were able or willing to obtain such a diploma.[29] When an apprentice did so, as Edward Parrish said in 1864, his practical knowledge was rounded off "by a certain amount of scientific training, which, with his experiences in the shop, forms a fitting preparation for the duties of his profession." But for the man who was part of the "vast majority" who did not have this foundation, said Parrish, "the chances are against his ever advancing beyond the mere tradesmen."[30]

In medical education during the first half of the 19th century the lecture series lasted for three to four months, although in 1849 the American Medical Association reaffirmed its demand for reform through extension of the course to six months.[31] To receive a diploma the medical students had to repeat the same

[26]England, *The First Century*, 406.
[27]Wimmer, *The College of Pharmacy*, 28, 30; England, *The First Century*, 147; W. B. Day, "The School of Pharmacy," in *Alumni Record of the University of Illinois, Chicago Department*, (1921), xxvi, cited by Kremers and Urdang, *History of Pharmacy*, 209.
[28]Wimmer, *The College of Pharmacy*, 20 f., 35; England, *The First Century*, 147.
[29]William Procter, Jr., et al., report of the committee on Textbooks, in *Am. J. Pharm.*, 28: 490, 1856.
[30]Edward Parrish, "A Systematic Course of Study and Manipulation for Students of Pharmacy," in *Proc. Am. Pharm. Assoc.*, 12: 274, 1864. This outline was volunteered by Parrish to aid apprentices in home study and to encourage other pharmaceutists to open schools of practical pharmacy after the Parrish pattern. The study materials and outlines appearing here relate to "the practical part of our business," and were not intended by the author to cover theoretical and scientific aspects.
[31]"Report," *Transactions American Medical Association*, 2: 40, 1849.

lecture series for a second year and complete a three-year apprenticeship with "a respectable practitioner."[32]

A knowledge of Latin and natural and experimental philosophy was a customary admission requirement, but Norwood states that the period 1810 to 1860 brought "a growing tendency to minimize and even entirely neglect mention" of these prerequisites.[33]

The position of the youthful American Medical Association was squarely opposed to any such tendency. Noting in its comprehensive 1849 report the contrast between medical education here and abroad, the Committee on Education said, "It is wisely considered [in Europe] that without preliminary training and knowledge in the several departments of general science, their minds are not properly prepared for receiving instruction in the high and complicated branches of professional education."[34]

How firmly the preceptor system was entrenched in medicine, as well as pharmacy, before the Civil War was illustrated when the American Medical Association's demand for extending the medical course to a minimum of six months, drew a reply from Harvard that ". . . four months in the year is quite as long a proportion of the students' time as can be profitably occupied in attendance upon lectures . . ."[35] In a special report intended to refute the Harvard contention that a four-month course was quite enough, the Association also stressed "new branches" forming the "scientific basis of medicine" as a justification for a longer course.[36]

The emphasis in pharmacy on "practical" academic instruction, as a completion or rounding out of the apprenticeship, is reflected in the textbooks used around 1857. They were predominantly practical, except in chemistry, judging from the texts Remington found were then in use.[37] A similar conclusion may be drawn from the list of reference works recommended to the pharmacist in 1856 by Procter. In chemistry, British, French and German

[32]Norwood, *Medical Education*, 403 f.
[33]*Ibid.*, 403 f.
[34]F. Campbell Stewart, "Report," in *Trans. Am. Med. Assoc.*, 2: 276, 1849.
[35]John Ware,, et al., in *Trans. Am. Med. Assoc.*, 2: 356, 1849. In taking this attitude the Harvard faculty was not rejecting the idea of better trained physicians, but thought the need was for more "private personal study" and preliminary education, rather than for longer academic medical study.
[36]Samuel Jackson, et al., "Report," *Trans. Am. Med. Assoc.*, 2: 361, 1849.
[37]Joseph P. Remington, "Pharmacy During the Last Fifty Years," in *Drugg. Circ.*, 51: 19, 1907. He mentions the United States Pharmacopoeia, United States Dispensatory, Pereira's Materia Medica, Mohr and Redwood's Practical Pharmacy, Parrish's Practical Pharmacy, and Fowne's Chemistry.

scientific texts (in English) are suggested; all others are elementary compilations, formularies, or technologic encyclopedias.[38]

Significantly, three of the four real textbooks listed by Remington are taken over from the British by American editors. The United States not only lacked such academic tools of its own but preferred to borrow British texts, rather than the more theoretical French and German works.

The chemistry text, "A Manual of Elementary Chemistry" by George Fownes, Ph.D., of the University College in London, was a more systematic and scientific treatment than Attfield's chemistry, which gained popularity in a later period. An American edition of Fownes' book was advertised in 1852 as "an elementary textbook" that the *London Journal of Medicine* called "the best text-book on chemistry now in existence."[39] The later 1868 edition—the oldest one available for examination—lends some credence to the advertising claims. It is a well integrated, general text on the principles of chemistry, both inorganic and organic, and describes laboratory techniques with the aid of illustrations of apparatus. The aim, says the preface, is "to prepare the student for the perusal of original memoirs, which in conjunction with practical instruction in the laboratory, can alone afford a real acquaintance with the spirit of research and the resources of Chemical Science."[40]

Procter was one of those recommending Fowne's book, which he considered well adapted to the needs of pharmacy apprentices for a compact text offering fundamental principles. Books by "Grahame, Kane and Turner" were suggested as alternatives. Procter had in mind mainly home-study, and he warned his readers that "The study of analytical and applied chemistry must always *follow*, if pursued at all, the elementary studies above

[38]William Procter, Jr. [Report of the Committee on Textbooks], *Amer. J. Pharm.*, 28: 493, 1856. To pharmacists Procter's Committee recommended the following list: "Gmelin's handbook of Chemistry, 12 vols., now published by the Cavendish Society, Regnaults Chemistry, 2 vols., Lowig's Principles of Organic Physiological Chemistry, Gregory's Organic Chemistry, (1856), Muspratt's Chemistry of Arts and Manufactures, Booth's Encyclopedia of Chemistry, Griffit's Medical Botany, Pereira's Materia Medica, Dorvault's l'Officine (a compendium of information of various kinds that relate to the apothecary business, in French), Redwood's Graham's Supplement, Griffith's Universal Formulary, Mohr and Redwood's Practical Pharmacy, Parrish's Practical Pharmacy, Darby's Translation of Wittstein's Pharmaceutical Chemistry."

[39]Jonathan Pereira, *The Elements of Materia Medica and Therapeutics*, (Blanchard and Lea, Philadelphia, 1852), quoted in advertising section, 15.

[40]George Fownes, *A Manual of Elementary Chemistry*, (10th ed.) (London, 1868), 1020 pages. The 1852 edition is only half as large, however, as this 1868 edition.

referred to . . .". Procter evidently did not consider such study very probable.

At this time (1850's) chemistry still held the dominant place with regard to theoretical study for pharmacy. For Procter, and his Committee, it was "the most important as it is the most difficult of all the collateral branches of a pharmaceutist's education; the one that gives him the most power when applied to his professional pursuits, . . . none can expect to excel who do not make it their study."[41]

An 1852 American edition of "The Elements of Materia Medica and Therapeutics" by the Englishman Jonathan Pereira, M.D., F.R.S. and L.S., reflects the typical encyclopedic approach to this subject. Under an elaborate classification the work offers (as the material would be categorized in modern times) a short discourse on clinical psychology, discussions of physical therapy, hygiene and dietetics, pharmacology, and physiological classification of drugs, with the bulk of the treatise devoted to the individual drugs—their therapeutics and pharmacy, with interjections concerning the chemistry or pharmacognosy involved.[42]

As an "encyclopedia of materia medica" which had a "beautiful arrangement" the two-volume text led William Procter, Jr., in 1856 to say that "Next to the United States Dispensatory we would place the great work of Pereira."[43]

Pharmaceutical botany had not yet come into its own in the United States, but two years later (1858) Procter was recommending that apprentices study botany, using Asa Gray's "First Lessons . . .", which became so popular for pharmacy instruction in following decades. It goes without saying, perhaps, that chemistry remained "the foundation of all correct pharmaceutical knowledge."[44]

On the basis of his teaching experience at the Philadelphia College Procter could advise students attempting self-education that they should have "elementary works on chemistry, botany and

[41]William Procter, Jr., at al., [Report of the Committee on Textbooks], *Am. J. Pharm.*, *28*: 492, 1856.
[42]Jonathan Pereira, *Materia Medica*.
[43]William Procter, Jr., et al. [Report of the Committee on Textbooks], *Am. J. Pharm.*, *28*: 491, 1856.
[44]William Procter, Jr., et al., "Syllabus of a Course of Study Intended as an Aid to Students of Pharmacy Who Cannot Avail Themselves of Regular Instruction," in *Proc. Am. Pharm. Assoc.*, *7*: 105, 1858.

natural philosophy" because they "will be needed to understand the language of the Dispensatory."[45]

It was not expected, however, that the apprentice would consider only elementary chemistry, botany and natural philosophy within his scientific range. In outlining his program of home study, Procter indicated that such subjects as mineralogy, zoology and crystallography were relevant but not essential.

"Mineralogy and Zoology are far less important to the pharmaceutist than chemistry and botany, and may be left to a later period, and then only entered on so far as to get a proper idea of their classification and arrangement, and of the species chiefly contributing to medicine, unless desired by the student."[46]

"The pharmaceutical student is not required to enter minutely into crystallography," Procter commented further, "but he should be acquainted with the outline of the science, the construction of the six systems or classes of crystals . . . The crystallization of chemical salts and other bodies is one of the most interesting portions of practical pharmacy. . ."[47]

As to the texts in pharmacy proper, these were primarily descriptive compilations concerning the "art," with minimum theoretical content. Mohr and Redwood's "Practical Pharmacy," one of the texts mentioned in Remington's list, was a British translation of Carl Friedrich Mohr's "Lehrbuch der Pharmaceutischen Technik," which Procter brought out in a modified American edition. Although originally a German text, it was widely valued as an elementary and eminently practical guide, rather than for scientific content. Its successor in the United States was Edward Parrish's "Introduction to Practical Pharmacy," a book issued in 1855 primarily for medical students. The book had a growing use among pharmacy students in subsequent years. When the 1864 edition came out with an "enormous increase in theoretical and scientific matter" it reflected the beginning of a new outlook on pharmaceutical education.[48]

[45] *Ibid.*, 105.
[46] *Ibid.*, 106.
[47] *Ibid.*, 23. It should be noted that such comments are taken out of context and are a minor part of the syllabus prepared by Procter, which was devoted mainly to use of equipment (e.g., mortar, spatula), processes (e.g., filtration, percolation), weights and measures, and a detailed classification of drugs on a pharmaceutical basis (e.g., sugars, preparations of iodine, gums). Procter observed that the alphabetical arrangement of the much-consulted Dispensatory made meaningful study next to impossible without a guide classifying the interrelated groups of drugs.
[48] The title was then change to "A Treatise on Pharmacy,"—the word "practical" significantly disappearing from the name. See Kremers and Urdang, *History of Pharmacy*, 278 ff. for further discussion of this text.

Little is known about the libraries available to students, much less the extent to which scientific reference works—or even the regular textbooks—may have been consulted. Within a few years of their founding both the Philadelphia and New York colleges could refer to a "library."[49] Six years after the founding of the Massachusetts College of Pharmacy its 24 members were operating a library of considerable scientific merit for that time, even though no systematic instruction was offered. The 1829 library catalog has come down to us and a commentary on the chemical part was published by Edward Kremers.[50]

This collection probably reflects what the pharmaceutical elite of Boston needed, or thought they should have, in their library. Chemical texts predominate, supporting the assumption that it was in chemistry that American pharmacists began and made their best progress toward a scientific foundation for pharmaceutical practice. Kremers' survey of the chemical titles and authors in the 1829 catalog shows that both the phlogiston and anti-phlogiston schools were well represented. This is still another example of the fact that the new chemistry was slow in reaching complete dominance in the field; and of course for the apothecary, the fact that two authors took antagonistic theoretical viewpoints did not mean that both could not offer something of value for pharmaceutical practice.

Natural philosophy (physics) is represented by a single volume. Botany and mineralogy held a minor place, while the variety of books on medical topics was undoubtedly a reflection of the ill-defined separation of medicine and pharmacy.

By the end of the Civil War the library at the New York College had grown to about 300 volumes, of which the College judged "some few books are valuable, the others very obsolete."[51]

Another factor providing some insight into the scientific level of instruction is the faculty—it's qualifications and conditions of service. Kremers concluded that lecturers attached

[49]Anon., "Minutes of the College," in *Journal of the Philadelphia College of Pharmacy*, 1: 24, 1830. Wimmer, *The College of Pharmacy*, 41 f.

[50]Kremers, "Works on Chemistry in the Early Library of the Massachusetts College of Pharmacy," in *Bulletin of the Massachusetts College of Pharmacy*, (Boston, December, 1934), 22-30. A facsimile of the 1829 catalog, together with a list of the College members, appears at the same place, 16-21.

[51]From College records quoted by Wimmer, *The College of Pharmacy*, 61. At Boston the Massachusetts College always took pride in its library, even though it did not have regular instruction until after the Civil War.

to colleges of pharmacy often considered the positions mere stepping stones to better posts.[52] Obviously too their main interests lay elsewhere, for the course required but three evening lectures per week, or less, for a few months out of the year.

At the Philadelphia College of Pharmacy all but one of the chemistry instructors up to the Civil War were home products of American schools. But they were well educated for their time and often distinguished members of the Philadelphia scientific community. Three of the four men who taught chemistry for any length of time held the A.B., and all of them held the M.D. degree. At the New York College five of the six chemistry instructors up to the Civil War held the M.D. degree. At least one reached some eminence as a scientist. The sixth man was "a chemist, formerly of Einburgh." One Ph.D. appeared on the scene at the New York school in 1865, Charles F. Chandler, a chemist who became well-known in his field.[53] Prior to the Civil War not only the Americans teaching pharmaceutical chemistry, but most teachers of chemistry in general, had been limited in their formal education to American medical schools.[54]

It is a logical assumption that the men available in the two cultural centers of Philadelphia and New York before 1868 were more competent on the average than those teaching at other schools. More extensive information and careful comparative study is needed, however, to permit confident generalizations about the competence in science teaching.

It should be mentioned that the M.D. degree in this period has no self-evident importance. Such degrees could be easily obtained and sometimes were coveted merely as a prestige symbol, since the M.D. was the only "advanced" degree available in this country. Not until 1861 did Yale award the first Ph.D. degree in this country.[55]

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[52]Edward Kremers, "The Teaching of Pharmacy . . .," in *Drugg. Circ.*, 51: 61 and 78, 1907.

[53]This preliminary estimate of the qualifications of early science instructors at the New York and Philadelphia Colleges has been based on information garnered from Wimmer, *The College of Pharmacy of the City of New York*; England, *The First Century of the Philadelphia College of Pharmacy*; and Howard A. Kelly and Walter L. Burrage, *A Cyclopedia of American Medical Biography*, 2 vols., (W. B. Saunders Co., Philadelphia, 1912). For a good sketch on Chandler see *The National Cyclopedia of American* Biography, (James T. White & Co., New York, 1906) XIII, 57.

[54]George Urdang, "The Part of Doctors of Medicine in Pharmaceutical Education," *Amer. J. Pharm. Edu.*, 14: 549, 1950.

[55]Cole, *Irrepressible Conflict*, 211.

As Kremers and Urdang rightly concluded, "The conditions within the drug trade around 1850 and for decades afterwards made a scientific basis for the whole of American pharmacy a remote objective, and the situation within the sciences of pharmacy made each American teacher in pharmacy a pioneer in his field."[56]

The little science instruction offered during the period was further self-limited by a complete lack of laboratory work, either optional or required. It was hoped that the student would experiment and get laboratory experience as part of his apprenticeship. Moreover, the colleges were often barely able to keep going, much less operate costly laboratory facilities.

According to Kremers, perhaps the first activity analogous to a laboratory or investigative approach was "the botanical excursions taken during the spring of 1864 at St. Louis and the 'identification' of specimens collected."[57]

An isolated attempt to supply laboratory instruction was made in Philadelphia at Parrish's "School of Practical Pharmacy" in the back of his apothecary shop. Being an endeavor of limited scope and primarily for the instruction of medical students, it was hardly consequential for pharmacy. This back-room laboratory was one of the few American examples of a European pattern, where eminent pharmacists taught pharmacy and chemistry in the laboratories of their shops, often continuing this practice even after being taken into a university faculty. George Urdang states that "The Apothecary laboratories were, especially in Germany, undoubtedly the precursors of the later university laboratories."[58]

In establishing a laboratory primarily for instruction of physicians Parrish apparently took the attitude that since pharmacy had a field of its own, then it should have its own independent standards and instruction. If, because of sparsely settled country or for whatever reason, physicians and other persons besides pharmacists expected to practice pharmacy, then they were to be taught by competent pharmacists.[59] By 1849 when Parrish opened his School of Practical Pharmacy at least a segment of

[56]Kremers and Urdang, *History of Pharmacy*, 207.
[57]Kremers, "The Teaching of Pharmacy . . .," in *Drugg. Circ.* 51: 68, 1907.
[58]George Urdang, *Pharmacy's Part in Society*, 26.
[59]Kremers and Urdang, *History of Pharmacy*, 207 f.

American medicine recognized the possibility that an educated physician expecting to compound his own drugs might advantageously study under a qualified apothecary.[60]

The fact that Parrish taught pharmaceutical technique to "nearly five hundred students" in fifteen years seems to indicate that his instruction supplied a need felt by medical students.[61] (It seems probable that most of the 500 were students of medicine; this is well over the total number of students graduated at the Philadelphia College of Pharmacy up to the Civil War.)

Nowhere in the United States had the practice and theory of pharmacy been fruitfully joined in the teaching of personnel for the field of medical care. In the better medical schools the student was being given a natural science foundation, but the understanding and teaching of applied pharmacy was lacking; in the schools of pharmacy proper, the structure of apprentice training was "rounded out" without any firm foundation of science.

When, however, a "practical department" opened at Parrish's "school" in 1859 for the benefit of "pharmaceutists and physicians," the pharmaceutist was mentioned first. This department was conducted by John M. Maisch, an eminent pharmacist who had entered the calling through apprenticeship but also had some education in chemistry. The announcement of his appointment as superintendent of the new department said:

"Besides the [laboratory] instruction in practical pharmacy, a **Laboratory for Practical and Analytical Chemistry,** designed in particular for the wants of pharmaceutists and physicians, will be opened . . . The course of instruction in Practical Chemistry will embrace the preparation of elementary bodies and their compounds, researches on the properties, reactions, combinations and decompositions of the same, and the most approved modes for investigating their purity.

"In Analytical Chemistry, the preparation of test liquids, the qualitative and quantitative analysis of inorganic, and of the more prominent organic compounds, and the analysis by means of the blowpipe, will be taught. Instruction will also be given in the **proximate analysis** of crude vegetable bodies, to which the particular attention of medical and pharmaceutical students is visited.

"For students sufficiently advanced, it is the intention to pursue a practical course of toxicological analysis. . ."[62]

[60]F. C. Stewart, "Report," *Transac. Am. Med. Assoc.*, 2: 351, 1849.
[61]Edward Parrish, "A Systematic Course . . ." in *Am. J. Pharm.* 12: 275, 1864.
[62]From a reproduction of a leaflet in M. I. Wilbert, "John Michael Maisch, An Ideal Pharmacist," in *Am. J. Pharm.* 75: 357, 1903.

This was an ambitious project but may not have been long lived; at least Maisch's "connection lasted but a little while."[63]

The pattern for the venture may have been European schools, such as that under Liebig at Giessen, which offered laboratory instruction in applied chemistry for both chemistry and pharmacy students. Here too was the example and model to be followed by the Pharmaceutical Society of Great Britain when in 1844 it opened the first laboratory in England for pharmaceutical instruction.[64] This was less than five years before Parrish began his laboratory instruction.

It was not only in pharmacy that the first laboratory instruction started outside of the regular schools. In 1824 Amos Eaton outfitted his residence, with funds from Stephen van Rensselaer, for practical instruction in chemistry and other sciences.[65] Besides the new Rensselaer School, early commercial analytical laboratories of J. C. Booth in Philadelphia (1835) and Charles T. Jackson in Boston (1836) offered competent practical instruction to private students.[66]

Several years later, in 1842, Benjamin Silliman, Jr., "instructed a few students in laboratory work," but it had to be in his private workshop at Yale, having no connection with the college.[67] Up to the time John Maisch began the laboratory teaching mentioned above, there were only a half dozen chemical laboratories in the United States giving real instruction.[68]

The situation in medical schools was similar. One of the two main reforms called for by the American Medical Association in 1849 was the positive requirement of laboratory methods, but only practical anatomy became obligatory. Even in some of the better medical schools this had theretofore been optional.[69]

After 1852 the American Pharmaceutical Association became increasingly active in promoting education in general and scientific work in particular. The reports on textbooks and a syllabus by committees headed by Procter (referred to previously) were early Association projects; and the course outline volunteered by

[63]England, *The First Century*, 405.
[64]Jacob Bell and Theophilus Redwood, *Historical Sketch of the Progress of Pharmacy in Great Britain*, (Pharmaceutical Society of Great Britain, London, 1880) 167 and 175.
[65]H. S. Van Klooster, "The Beginnings of Laboratory Instruction in Chemistry in the U.S.A.," *Chymia*, vol. 2 (Philadelphia, 1949), 7-11.
[66]*Ibid.*, 10; Struik, *Yankee Science*, 191 and 340.
[67]Struik, *Yankee Science*, 340.
[68]*Transac. Am. Med. Assoc.*, 2: 284 ff., 1849; *Pharm. Rev.* 21: 360, 1903.

Parrish was publicized through the Association. The Association also served as a medium for publishing technical papers from various members, some of scientific merit.

In fact when scientific workers of British pharmacy associated themselves as the British Pharmaceutical Conference one of their models was the "good work done by the . . . American Pharmaceutical Association, established ten years previously, in the field of pharmaceutical science particularly."[69]

Leaders of the Association wisely saw that technical, specialized knowledge was one of the keys to professionalization. They stuck to their constitutional objective "To improve the science and art of pharmacy by diffusing scientific knowledge among apothecaries and druggists . . ." But their scope in the educational field was limited to the tradition-encrusted mold of the apprenticeship system.

By the 1860's the inception of laboratory work in scientific instruction generally, was reflected in the goals of pharmaceutical education. Horizons were also being modified by other social and cultural changes following the Civil War. But to provide an adequote basis for scientific development a new frame of reference for pharmaceutical education was needed. The traditional pattern had to be broken.

III. The Mold Broken (1868-1900)

Until after the Civil War pharmaceutical education and the general institutions of higher learning in the United States went entirely separate ways. But emergence of the state university on the American scene during the first half of the century was to prove of primary importance in pharmacy. Such institutions tended to have a more democratic outlook than the old-line universities, which emphasized liberal education for the upper class. In the state university the pendulum swung far the other way: emphasis was on practical subjects to serve the people's needs, on applied science and the training of replacements for the professions.

One of the state institutions most alert to these needs was the University of Michigan, which in 1868 became the first to establish a course in pharmacy. Unhampered by dependence on ticket sales for support, or by the encrusted tradition of the ap-

[69] F. W. Gamble, "The Conference, Past and Present," in *Chemist and Druggist*, 99: 129, 1923.

prenticeship system, or by those with a vested interest in the *status quo*, there emerged a radical departure in pharmaceutical education. The two most significant features were complete disregard of the apprenticeship as a requirement for graduation—elsewhere considered the very core of a pharmacist's education—and heavy emphasis on basic science without regard for what seemed functional in the average "store."

Such heresy becomes understandable only in the light of the Michigan tradition. The University had made great strides under its aggressive president, Henry P. Tappan, whose guiding star was European academic thought and the German university in particular.[1] His successor, E. O. Haven, took special pride in his science courses, and during his regime set up new courses in chemistry and physics, as well as pharmacy.[2]

The University of Michigan medical school had been "unique in that it bravely set high standards.[3] In the medical curriculum pharmaceutical instruction was naturally included. Medical students and others who might be aiming at either part-time or full-time practice of pharmacy were taking a laboratory course in pharmacy eight years before the separate pharmaceutical curriculum was organized.[4]

Thus it was a rather easy transition to a special "Course of Study in Pharmacy" within the Department of Science, Literature and Arts, requiring for completion "one and a half to two years" of study,[5] with a sound scientific education as its supreme goal and with facilities to reach its objective. This move was interpreted as a challenge by pharmacy schools then in existence. The battle lines were drawn at the St. Louis meeting of the American Pharmaceutical Association in 1871. Here the University of Michigan School of Pharmacy was denied recognition, since it was not "within the proper meaning of our Constitution and By-laws, a College of Pharmacy: it being neither an organization controlled by pharmacists, nor an institution of learning which, by its rules

[1]It was not until 1863 that proponents of Americanism could oust him as a "completely foreignized specimen of an abnormal Yankee." Cole, *Irrepressible Conflict*, 210.
[2]Kent Sagendorph, *Michigan, The Story of the University*, (Dutton, New York, 1948) 118.
[3]Norwood, *Medical Education*, 351 f.
[4]Albert B. Prescott, "Silas H. Douglas as Professor of Chemistry and Pharmacy," in *Pharm. Rev.*, 21: 360, 1803; and Kremers, "The Teaching of Pharmacy . . .," in *Drugg. Circ.* 51: 76, 1907.
[5]*University of Michigan Catalogue, 1868-69*, (Univ. of Mich., Ann Arbor, 1869), 56.

and requirements, insures to its graduates the proper practical training, to place them on a par with the graduates of the several colleges of pharmacy represented in this Association."[6]

Dr. Albert B. Prescott, professor of organic chemistry and pharmacy at Michigan, had not planned to present a paper. But a later session found the modest, benign-looking professor of thirty-nine stumping to the platform with his cane, a constant companion since a boyhood accident. ". . . Circumstances occurring since the opening of the meeting," he said, "have caused me to present, very briefly, the views upon a few points which I have held for some time."[7] Then in his slow spoken, deliberate way he fought back. He championed the supreme value of a new school of thought: scientific education in pharmacy, when he said:

"In a large number of instances, the apprentice is led to perform mechanical labor in blind ignorance of the nature of the material with which he deals; he becomes habituated to a feeble and automatic mode of action, and hence, too often, he never afterward breaks through to the light. Elementary textbooks on chemistry and botany are not placed in his hands; he learns to refer to official and non-official authorities, and to follow after statements and methods which he does not understand; and, too often, he finally ceases to 'wonder why' he does this or that. The history of processes of preparations and the discussion of physical and chemical ways and means are in a tongue unknown to him.

"In many instances, this condition of things may be remedied by the pharmacists having apprentices in charge, but in this country and at present, in a **far larger** number of instances, such remedy is impossible, because the pharmacist has little more science than his apprentice. He also was a blind apprentice, if he was an apprentice at all, and he is too often unconscious or regardless of his own deficiencies . . . From this [apprenticeship] beginning, year after year still leaves him at the mercy of wholesale deceptions, innocent of the wrong done under his hand, if we may term him innocent whose ignorance places human life in daily jeopardy.

"In Germany, the state requires and regulates apprenticeship, enforces instructions during the same, and secures the scientific character and the efficiency of such instruction by official examination; and the same fact is true, to a certain extent, in Great Britain. It is evident that before we can hope for such apprenticeship, we must obtain a new generation of competent masters by some other means.

[6] [Report of a special committee], in *Proc. Am. Pharm. Assoc.*, 19: 47, 1871.
[7] Albert B. Prescott, in *Proc. Am. Pharm. Assoc.*, 19: 96, 1871.

"There is now a general demand for scholastic training in technical science for all young men who are to enter upon vocations requiring applications of science: engineers, miners, manufacturers, mechanics, agriculturists, and (shall they be named at the last?) pharmacists. Every year this demand is notably more imperative. This education, of inestimable advantage to the pharmacist **whenever** obtained, is certainly never more useful than when secured **before** apprenticeship. This is the logical order; first principles, and then their applications. It is true that from **didactic** college instruction only, the principles of science are feebly apprehended, and especially in physical and chemical science, but vague and evanescent ideas are likely to be obtained by lectures alone.

"But, as we have just seen, it is not in the shop that the conditions of practical study are to be found at present; indeed, such conditions never can be so perfectly furnished in the shop as in the school laboratory. And it is the growing conviction of thoughtful educators, that physical science must be, and **is to be taught in college laboratories.** The student must handle the materials and wield the forces of physical and chemical action before he obtains a clear acquaintance with the same. And it is more than knowledge of natural forces, it is the skill to guide those forces that constitutes power, and such skill is best acquired in school laboratories. Moreover, the mental and manual discipline of laboratory science-work under the teacher, the training in care and accuracy imperative thereto, is excelled by no other discipline for the perceptive, inductive and executive faculties, and it is discipline especially useful in the vocation of pharmacy. Such laboratory work ought not be briefly completed; the broad field of pharmacy, reaching far into the sciences of inorganic and organic nature, require years of pupilage. A preparation that is to give ability, interest and good success to the lifetime should not have its opportunities too grudgingly counted in months.

"But it may be urged, will young men who have taken and graduated from college courses in technical science, be willing to enter into the drudgery of apprenticeship in the shop of the apothecary, there to learn those practical details of daily duty and sales, which every one admits can be better learned in the shop; indeed, cannot be learned elsewhere? The question has its parallels. Farmers and mechanics cry out with fear, that too much school education of any sort may lift their sons above their vocations. It is a question asked at thousands of firesides, but the world is full of answers,—there is no danger of too much schooling. . .

"That young man whose knowledge of science breeds contempt of handicraft, has but poorly learned science, and has missed its true enthusiasm. . .

"It is precisely to the **ignorant** apprentice in pharmacy that its work is drudgery. Too many of our apprentices have not taken that

step which the world has taken in little more than a generation,—the step from the dreary charm-dealing to scientific pharmacy. Give them first the fundamental sciences, and the daily duties of apprenticeship become invested with constant interest."[8]

It was not just talk. But for a long time the University of Michigan stood alone. The old-line schools went their own way, with Philadelphia and the other better schools striving to improve instruction within the restricting frame set in the early part of the century. Then in 1883 the University of Wisconsin established its department of pharmacy, followed in quick succession by the state universities of Indiana, Ohio and Illinois, joined by others farther west by the end of the century.[9]

Buttressed by a university structure and tax support, the state schools of pharmacy could require of applicants some premilinary education—thus assuring more meaningful, productive scientific instruction.[10]

The issue became a crucial one for pharmaceutical education, since a lack of admission standards partly blocked other efforts to upgrade instruction in the science area. Prof. E. S. Bastin of the Chicago College of Pharmacy brought the issue into the open at the 1888 meeting of the American Pharmaceutical Asso-

[8]Albert B. Prescott, "Pharmaceutical Education," in *Proc. Am. Pharm. Assoc.*, 19: 425-429, 1871. This important address by Prof. Prescott, director of the Michigan course, is quoted here only in part.

[9]Kremers, "The Teaching of Pharmacy . . .," in *Drugg. Circ.*, 51: 75, 1907.

[10]While the state schools took the leadership in this respect, the first steps were hesitant. Four years after the pharmacy course was initiated at the University of Wisconsin the University catalogue stated that pharmacy applicants who could not present a high school diploma or "written evidence of a satisfactory preliminary education will be subjected to such an examination in arithmetic, grammar, English composition, civil, political and physical geography, and history of the United States as will afford a guaranty that the applicant is capable of pursuing with advantage and profit to himself the studies of this department." This examination covered the same general areas of knowledge as the general admission examination for all college and engineering courses; hence it is significant that not the general examination but a special one was given to pharmacy applicants. (One obvious point of difference is that only arithmetic is mentioned under the mathematics part of the examination for pharmacy applicants whereas the general university examination also mentions algebra and plane geometry.) (*Catalogue of University of Wisconsin, 1887-88*, Madison, Wis., 1888, 40 and 42.)

Admission requirements at Michigan at this time were roughly analogous. Applicants who could not present a high school diploma were expected to take an admission examination, one more advanced than that at Wisconsin and including physics (that covered by "Norton's Natural Philosophy") and botany (the first 27 chapters of "Gray's Lessons"). Students who had been "engaged in the practice of pharmacy, in some capacity, for at least two years," apparently were exempt from the examination, although on the basis of the catalog statements it is difficult to be certain. It appears that such applicants (two years' experience, without high school) could be admitted without taking the qualifying examination, but had to pass it sometime before graduation; and when it was taken, these students apparently did not have to demonstrate their qualifying knowledge in physics and botany. (*Annual Announcement and Register of Alumni of the School of Pharmacy of the University of Michigan, 1887-88*, Ann Arbor, 1887, 8-10.)

A decade earlier (1878) even the Michigan course could only require "for admission to the School of Pharmacy, that the student posses a good knowledge of the English language, as determined by written examination." (*Calendar of the University of Michigan 1877-78*, Ann Arbor, 1878, 81.)

ciation. At that time there were only a few pharmacy schools, mainly at the state universities, that enforced any significant admission requirement. In Bastin's own experience an applicant was rarely rejected. Yet, not more than a tenth of applicants were high school graduates, he contended, not a fifth had been in high school, and "a considerable percentage do not even have knowledge of the 3 R's . . . Many of the students are entirely unfitted to grapple with such subjects as botany, physics, chemistry, and many of the branches of pharmacy."[11]

As late as the 1890's a survey by the *Pharmaceutical Era* showed that of 22 independent schools reporting, two stated that entrance was based on a high school level of education. All the rest required grammar school or less.[12] Rusby maintained that at this time even when "grammar school graduation was nominally required, neither this nor any other requirement was actually insisted upon.[13]

It is in this light that the curriculum of the last quarter of the century must be viewed in the independent schools. Ticket series of evening lectures were still customary, although afternoon classes were not unknown. Around the mid-70's, one, two or three lectures per week might be given over a period of four or five months.[14] Paralleling changes in medical education, the course content was now often different for the second term of lectures required. Instruction still followed the pattern of three lecture courses: chemistry, materia medica, and pharmacy. Botany received more systematic treatment, usually recognized by the joint title, "Materia Medica and Botany," or it might occasionally be taught as a separate subject (as at Massachusetts). Other material was sometimes added within the limits of the system, as at New York where the chemistry course was now "Chemistry and Toxicology."[15]

At the Conference of Schools of Pharmacy held in 1870 and in 1872 (following a similar associative effort by schools of

[11] E. S. Bastin, "On Pharmaceutical Education," in *Proc. Am. Pharm. Assoc.*, 36: 187, 1888.
[12] Anon., "American Colleges of Pharmacy," in *Pharmaceutical Era*, 14: 454, 1895.
[13] Henry H. Rusby, "Education in Pharmacy," in *Drugg. Circ.*, 65: 84, 1921.
[14] Instruction appears to have lasted about a month longer than in the earlier period.
[15] *Prospectus of the College of Pharmacy of the City of New York, 1876-77; Seventh Annual Announcement of the Cincinnati College of Pharmacy, 1877-78; Seventh Annual Catalogue and Prospectus of the Massachusetts College of Pharmacy, 1873-74; Eighth Annual Announcement of the Chicago College of Pharmacy, 1874;* England, *The First Century of the Philadelphia College of Pharmacy*, 344.

medicine), instruction in qualitative analytical chemistry was recognized as "desirable," but it had not yet materialized.[16] At the University of Michigan, however, pharmacy students not only took the old trio of subjects, but by 1876 were required to study quantitative analysis, organic analysis, urinalysis and toxicology, botany and microscopic botany, among other courses.[17]

The average level of scientific instruction undoubtedly took another step upward around 1880 with the inception of graded courses. As previously mentioned, some effort had been made earlier to vary the course content in the two "years" (i.e., 20- to 30-week lecture series), but now a definite effort was being made to proceed from elementary work the first term to advanced work the second.[18]

Without legal educational requirements, without an accrediting agency, without even an association of schools,[19] active development during the next decade brought a more marked differentiation among the schools in length, type and level of instruction. Then, in 1892, the University of Wisconsin dropped its bombshell on American pharmaceutical education. It announced an optional four-year course in pharmacy on a par with other university areas of instruction, when making two full academic years mandatory. Edward Kremers, the initiator of both courses, saw the two-yeat course as permitting "closer adjustment of the studies to those of the General Science course." In the four-year course he aimed at more than a "closer adjustment," offering pharmacy students the chance "to obtain a general education and to include in their course the pharmaceutical studies."[20]

Pharmaceutical education in the United States was now available in step-wise graduations from forty weeks to four years of total instruction, with obligatory attendance ranging from six to forty hours weekly.[21]

[16]Kremers, "The Teaching of Pharmacy . . .," in *Drug. Circ.*, 51: 73, 1907.
[17]*Calendar of the University of Michigan*, 1876-77, 81 ff.
[18]Anon., "Editorial Departmnt," in *Am. J. Pharm.*, 50: 461, 1878; Kremers, "The Teaching of Pharmacy . . .," in *Drugg. Circ.*, 51: 74, 1907; Rusby, *The New York College*, 30.
[19]In 1883 the Conference of Schools of Pharmacy died of inanition.
[20]Quoted by George Urdang, "Edward Kremers (1865-1941), Reformer of American Pharmaceutical Education," in *Am. J. Pharm. Edu.*, 11: 645 f., 1947.
[21]Oscar Oldberg, "Can a Minimum Standard of Pharmaceutical Education be Adopted?", in *Am. Drugg. and Pharm. Rec.*, 25: 224 f., 1894.

Describing his program for teaching the sciences in the four-year course, Dr. Kremers said: "General chemistry is followed by pharmaceutical chemistry, general botany by pharmaceutical botany, general physics by pharmaceutical technique. These somewhat specialized pharmaceutical studies can then be followed by pharmacognosy, practical pharmacy and thesis. It will largely depend on the caliber of the student and upon the amount of work required in these studies whether courses in physiology, pharmacology and toxicology; bacteriology, general and pathogenic; sanitation and hygiene; special food and drug analysis, pharmaceutical legislation and jurisprudence, etc. can be required or are to be offered as elective undergraduate or better even as graduate studies."[22]

No mention is made of materia medica, which by this time was fragmented and elaborated into several specialized scientific subjects. In the 1880's botany split off at four schools as a separate chair from materia medica (with which it was combined in the previous decade). The appearance of microscopic botany and pharmacognosy as separate disciplines in the state university schools has been noted. Instruction in toxicology began to be systematized in the 1870's, marked by adding it to the title of one of the old trio of courses (to materia medica at Chicago and, as previously mentioned, to chemistry at New York). Physiology began to receive attention, sometimes combined with materia medica. As some pharmaceutical teachers appeared on the scene from graduate study in Europe, a broad scientific concept was given to the new discipline of pharmacognosy late in the century.[23]

This proliferation of scientific studies in American schools of pharmacy late in the century must be partly evaluated in relation to the quality of faculty instruction. Pending a more detailed study of this question generalization would be hazardous. We do know that a few pharmacy teachers were taking graduate study abroad; the trend was toward independence from medicine as a source of faculty, although around 1890 almost half of those teaching materia medica and its branches still held the M.D. degree

[22]Edward Kremers, "The Position of the American Pharmaceutical Association Toward Pharmaceutical Education," in *Am. Drugg. and Pharm. Rec.*, *27*: 376, 1895.

[23]For further details on the elaboration of the old encyclopedic materia medica into the several scientific disciplines, see the excellent discussion by J. Hampton Hoch, "A Survey of the Development of Materia Medica in American Schools and Colleges of Pharmacy," *Am. J. Pharm. Edu.*, 12: 148-161, 1948.

alone or in combination with another degree not on the graduate level. Four of the teachers in this field, among 35 schools, held the Ph.D.[24]

As textbooks in the sciences basic to pharmacy in the 1870's and 1880's teachers were recommending that students use Attfield's book on pharmaceutical chemistry (which seems largely to have supplanted Fowne's chemistry although the latter is still mentioned); and in botany Gray's "First Lessons . . ." was the usual choice.[25]

Attfield's "Chemistry: General, Medical and Pharmaceutical" was an American edition of a British text. Unlike Fowne's chemistry it was designed for the practical needs of students of pharmacy and medicine, with the scientific limitations that implies. Although rather comprehensive within its defined scope and not ignoring theory, it omitted material concerning compounds and reactions not involved in medicine and pharmacy. Procedures concerning drug adulteration, toxicology and urinalysis, however, occupied an important place.[26]

Asa Gray's "First Lessons in Botany and Vegetable Physiology," "intended for the use of beginners, and for classes in the common and higher schools . . ." contained 34 lessons "made as plain and simple as they well can be." This served as an introduction and dictionary to Gray's "Manual of Botany," which was also occasionally used in pharmacy schools.[27]

The book was an elementary survey of systematic botany largely devoted to morphology, explaining in simple language how plants

[24]The data were compiled from C. S. Hallberg's *Pharmacal Calendar for 1892* by Edward Kremers, "Notes on Pharmaceutical Education: The Study of Materia Medica." in *Proc. Am. Pharm. Assoc.*, 40: 310, 1892; for data on schools at this time see also *Pharm. Rec.*, 3: 299, 1883. As to the total number serving on pharmacy faculties near the end of the century, a survey of 22 independent schools showed an average of about seven instructors per school—varying from four to twelve—which probably includes teaching assistants. Anon., "American Colleges of Pharmacy," in *Pharm Era.*, 14: 454, 1895.

[25]In materia medica, Pereira was still frequently recommended. See the school catalogs, such as those previously cited; also, Anon., "Pharmaceutical Education," in *Pharm Rec.*, 3: 392, 1883, and F. L. Patch, "Books and Methods of Study for a Clerk Learning Pharmacy Who is Unable to Attend College," in *Pharm. Rec.*, 5: 188, 1885; William M. Davis, "How to Study Pharmacy," in *Drugg. Circ. and Chem. Gaz.*, 32: 103, 1888.

[26]John Attfield, Ph.D., F. C. S., *Chemistry; General, Medical, and Pharmaceutical, Including the Chemistry of the United States Pharmacopoeia. A Manual of the General Principles of the Science, and Their Applications to Medicine and Pharmacy.* 2nd ed. (Henry C. Lea, Philadelphia, 1871). The book retained its popularity through at least 14 editions.

[27]Asa Gray, *First Lessons in Botany and Vegetable Physiology*, (Ivison and Phinney and G. P. Putnam and Co., 1857). See the preface, p. iii f. and 237. The book Gray's publisher advertised as especially "designed for the use of Professional Students and Amateurs of the Science" was not this work but Gray's *Botanical Textbook*.

grow and live and introducing the student to botanical classification and the terminology for more advanced work.

A few of the schools probably made available to students a rather adequate library of more advanced scientific work, especially in the state university schools. In the last quarter of the century, at least the Philadelphia, New York, Chicago, and Massachusetts colleges had libraries of from a hundred to several hundred volumes.[28] But Kremers felt that "for many decades the outlook of college of pharmacy libraries was depressing."[29]

Instruction in chemical and botanical science was upgraded considerably during the last quarter of the century with the emergence of laboratory instruction. This was given impetus by the laboratory work required at state university schools, where it supplemented or even partly supplanted lecture instruction in science. For Kremers at the University of Wisconsin there was no doubt, "The courses in the sciences are naturally to be largely laboratory studies."[30] In the 1870's the University of Michigan boasted that "the required laboratory work employs about four hours daily through both years," embracing three semesters in analytical chemistry, one in micro-botany, and one semester in pharmacy.[31]

In the sessions of the ill-fated Conference of Teaching Colleges of Pharmacy the "desirability" of laboratory work was recognized, but limited finances—the perennial problem of these independent schools—hampered the development of such an expensive form of instruction.[32] At the Philadelphia College the situation was met by support from a newly organized alumni association, whose first project was equipping a laboratory for practical chemistry and pharmacy. Opened in 1870, it became the first in the United States within an independent pharmacy school. Thereafter a number of the schools advertised laboratory instruction, but it was usually optional. In 1873-74 the Maryland College of Pharmacy made laboratory work in analytical chemistry mandatory,

[28] *Eighth Annual Announcement of the Chicago College of Pharmacy, 1874*; Edward Kremers, unpublished manuscript, 1932, American Institute of the History of Pharmacy Archives; Kremers, "The Teaching of Pharmacy . . .," in *Drugg. Circ.*, 51: 71, 1907.
[29] Kremers, loc. cit.
[30] Kremers, "The Position of the American Pharmaceutical Association Toward Pharmaceutical Education," in *Amer. Drugg. and Pharm. Rec.*, 27: 377, 1895.
[31] *Calendar of the University of Michigan*, 1876; 79.
[32] Kremers, "The Teaching of Pharmacy . . .," in *Drugg. Circ.*, 51: 61, 1907.

according to DuMez "the first instance in which laboratory work in chemistry was required by any of the [independent] schools of pharmacy in this country."[33] At this time botany lectures were presumably supplemented by optional "botanical excursions in most colleges of pharmacy in the United States."[34]

In the early 1880's microscopic laboratory work in botany began in New York, Philadelphia, Maryland and probably elsewhere.[35] But Rusby believed that at this time "A school that possessed more than one or two microscopes, into which the students were occasionally permitted to peer, was the fortunate exception."[36]

At the University of Michigan microscopic botany was introduced in 1875 and became mandatory the following year. Moreover, "The offering by Michigan of a laboratory course in experimental pharmacology and by Michigan, Minnesota, Purdue and Wisconsin of a laboratory course in bacteriology marks the final fragmentation of the old general materia medica."[37]

By the end of the century the "better colleges" among the old-line independent institutions had short obligatory laboratory courses,[38] although among schools generally the time required varied from zero to more than twenty hours weekly.[39]

As such reports of progress came in, the *Pharmaceutical Era* was moved to publish a glowing editorial about improvements in pharmaceutical education.[40] But later in 1894 the editors got a rude shock when they saw the answers submitted by school graduates to a chemistry examination that had appeared as an editorial feature. Obviously disillusioned, the editors commented:

". . . We have been surprised to see that some Ph. G's apparently have not the faintest idea of how to use a chemical equation, molecular weights and combining numbers in calculations, nor how to work out simple problems in proportion and make the proper corrections for

[33]A. G. DuMez, "Development of Pharmaceutical Education in the United States and Its Present Trend," in *J. Am. Pharm. Assoc.*, 21: 496, 1932.
[34]Anon., "Editorial Department," in *Am. J. Pharm.*, 47: 283, 1875.
[35]Henry H. Rusby, "Education in Pharmacy," in *Drugg. Circ.*, 65: 83, 1921; A. G. DuMez, "Development of Pharmaceutical Education . . ." in *J. Am. Pharm. Assoc.*, 21: 496, 1932; J. W. England, "The History of the Philadelphia College of Pharmacy in Relation to the Development of Pharmaceutical Education," in *J. Am. Pharm. Assoc.*, 11: 198, 1922.
[36]Rusby, *ibid.*, 83.
[37]Hoch, "A Survey of the Development of Materia Medica . . ." in *Am. J. Pharm. Edu.*, 12: 160, 1948.
[38]Anon., "Editorial," in *Pharm. Rev.*, 15: 151, 1897.
[39]Oscar Oldberg, "Can a Minimum Standard of Pharmaceutical Edueation Be Adopted?", in *Am. Drugg. and Pharm. Rec.*, 25: 225, 1894; Anon., "American Colleges of Pharmacy," in *Pharm. Era.*, 14: 454, 1895.
[40]Anon., "Teaching Methods in Schools of Pharmacy," [editorial], *Pharm. Era*, 11: 246, 1894.

percentage strengths of ingredients in a formula . . . There is no remedy in this deficiency save in insisting upon a proper entrance examination which will insure students of sufficient mental qualifications . . ."[41]

IV. Conclusion

By 1900 the doors had been opened for a re-integration of pharmaceutical education on the plane set by the state university schools of pharmacy. Under pressures such as the public glorification of applied science, progress in general education and other professions, and an increasing number of state-supported or university-affiliated pharmacy schools, the old attitude and restricting concepts had broken down. This permitted cooperative action leading to the founding of the American Conference of Pharmaceutical Faculties at the turn of the century, which was to have an important influence in raising standards generally, and in particular the level of instruction in the basic sciences supporting professionalized pharmacy.

The developing structure was buttressed legally by state pharmacy laws, which existed in most states by 1900, and after 1904 by gradual adoption of a legal requirement of graduation in pharmacy as a prerequisite for state board examination and licensure. Tardy and hesitant steps in raising the minimum entrance requirements continued to be an inescapable block in many schools to offering science instruction meeting a university standard, even through the early part of the 20th century.

But the mold cast a century before had been broken. The preceptor concept of vocational education that had become sacred to the profession, fettering scientific pharmacy within rigid bounds, finally became an appendage to a general scientific education.

The University of Michigan, and the influence of Prof. Prescott, was a decisive blow in shattering the old "store" concept and, equally important, showed the way toward an American pharmaceutical education based on science.

Since the early independent schools were caught in a web of attitudes and practical limitations that proved to be a dead end for scientific instruction, their primary contributions lay elsewhere: in starting the process of professionalization, in beginning institutionalized education, in raising general standards to the point

[41]Anon., "Defects in College Education," [editorial], *Pharm. Era*, 12: 99, 1894.

where at least a nucleus of pharmacists could understand what might be possible in pharmacy.[1]

Finally, where Prescott left off Kremers began, by not only recognizing but demonstrating that American pharmaceutical education should parallel the scientific standards of other university-taught professions. And with the four-year course the University of Wisconsin opened the way to the highest expression of science in professional education: graduate study and research.[2]

Looking back on the 19th century a contemporary journalist concluded:

". . . **More significant than this unacknowledged victory of rational educational principles over old traditions is the fact that these colleges as well as the universities are more and more fostering the scientific spirit. To a small extent this is made apparent by the affiliation of independent colleges with broader institutions of learning, or by at least securing the semblance of such affiliation. To a greater extent this is inwardly manifested, though possibly less generally recognized, by the recruiting of the instructional force with young men who possess a thorough scientific education.**"[3]

Frederick B. Power, famous chemist who had been the first director of the Department of Pharmacy at the University of Wisconsin, felt in the 90's that

"The aim of pharmaceutical schools should be to afford a broad and thorough training in the sciences pertaining to pharmacy or in those branches of natural science, theoretical and applied, upon which the successful practice of pharmacy depends."[4]

Others went even further in paying homage to the value of science in pharmaceutical education. Pharmacy's cue was taken from the observation that "the greater the scientific requirements of a profession, the more exalted its position in the world of science."[5] And there was talk of pharmacy resting on "all the natural sciences."

If science was not raised to the level of a panacea for pharmacy's ills by an important segment of the profession's leadership by the end of the century, it was at least considered the main door leading to higher social and professional status for the pharmacist

[1]Other and more specific contributions, such as original investigations, development of a literature, notably the *American Journal of Pharmacy*, etc., should not be minimized but do not come into focus within the present discussion.
[2]George Urdang, "Edward Kremers . . .," *Am. J. Pharm. Edu.*, 11: 650 f., 1947.
[3]Anon., "Editorial," in *Pharm. Rev.*, 15: 151, 1897.
[4]F. B. Power, "The Mission of Pharmaceutical Schools," in *Pharm. Era*, 11: 251, 1894.
[5]J. O. Schlotterbeck, "Pharmacognosy—Its Scope and the Methods of Teaching It," in *Pharm. Era*, 11: 249, 1894.,

A Student Experiment on Peripheral Blood Flow*

RAYMOND P. AHLQUIST
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The usual method for studying or demonstrating the cardiovascular actions of drugs is to determine their effects on the mean arterial blood pressure of experimental animals. The arterial pressure, being dependent upon such variables as the peripheral resistance, cardiac output, venous return, blood volume and blood viscosity, is not, however, a reliable criterion to use to determine the actual effects of drugs on any one of these variables. For example, the drug benzyl-imidazoline (Priscoline-Ciba) often produces an increase in mean arterial pressure when administered intravenously to dogs. This would imply that it produces vasoconstriction and an increase in the peripheral resistance. Investigation of its direct peripheral vascular action reveals, however, that benzyl-imidazoline produces only peripheral vasodilation, and that its pressor effect is due entirely to an increased cardiac output.[1] This example illustrates the importance of studying the peripheral blood flow directly.

The technique described in this paper meets the requirements of a good student experiment in pharmacology. The apparatus needed is simple in design, easy to use, and reliable in operation. The experiment can be readily carried out by students, or can be done as a class demonstration; and while the dog is the preferred experimental animal it can also be done using rabbits if necessary.

It should be stated at the outset that there are no simple, reliable methods for measuring blood flow which do not entail opening blood vessels and passing blood through glass, metal or plastic instruments. Anticoagulants must therefore be used; heparin, even though it is expensive is the agent of choice.

*Presented to the Conference of Teachers of Biological Sciences at the 1950 meeting in Atlantic City, N. J.

Many types of flowmeters are available. These include electromagnetic devices, the Ludwig stromuhr, the thermostromuhr, orifice meters, the rotameter and the "bubblemeter". The last two are the most suitable for routine teaching purposes.

The simple rotameter as described by Shipley[2] can readily be made from Lucite or Plexiglass. It consists of a tapered tube, the taper being made with a standard taper reamer, and a "float" made of alumninum or brass. The blood passing upward through the tapered tube raises the float to a height which is directly proportional to the rate of flow. The height of the float can be recorded on a smoked paper kymograph by means of a manually operated string and lever system. This flowmeter is calibrated after each experiment using a stop-watch and graduated cylinder. A calibration curve is then constructed from which the readings of float height can be converted into flow rate.

The "bubblemeter", first described by Soskin[3], an ideal flowmeter for student use is shown in Figure 1. This flowmeter can be constructed in any laboratory since it consists of nothing more complicated than a glass tube, a rubber stopper and a small thistle-tube.

The simplest set-up for using this flowmeter is as follows. Cannulae, either of glass or plastic, are connected to the flowmeter with short rubber tubes. A mercury manometer should also be connected into the system by means of a T-tube in the outflow side. The metering tube, bubble trap, connecting tubes and cannulae are filled with saline solution and clamps placed on the connecting tubes. Expose both femoral arteries in an anesthetized dog, heparinize the animal by administering about 10 mgm. per kgm. intravenously, and then cannulate one artery centrally with the inflow canulla and the other artery peripherally with the outflow cannula. Using both femorals makes the cannulations easier, but the cannulae can be placed in only one femoral making the surgical procedure simpler. Release the clamps and the blood will flow through the meter. As soon as the saline solution in the bubble trap has been replaced by blood, flow rate determinations can be started. This can be done either by using a stopwatch to time the passage of the air bubble between the calibra-

tion marks, or this time of passage can be signalled on a kymograph by means of a key and signal magnet.

The primary advantages of the bubble flowmeter are as follows: 1) The meter is easy to construct and use. 2) The calibration is fixed and the readings obtained can be readily converted into flow rate in cc. per minute. 3) The pulsatile nature of the arterial blood flow is clearly demonstrated by the motion of the air bubble.

The chief disadvantage of the bubble meter is the fact that the record obtained is discontinuous. There are intervals between successive air bubbles during which the flow is not being recorded. Also, the flow rate may change abruptly while the bubble is between calibration marks. This disadvantage can be overcome by placing a reversing valve in the metering system so that only a single air bubble need be used. One type of reversing valve that can be used is illustrated in Figure 2.

It is important to have a simultaneous arterial pressure record since the peripheral resistance is the relationship between the pressure and the flow. Depending on the diameter of the metering tube and the length of the connecting tubes there may be a considerable pressure drop across the metering system. Measuring the pressure in the outflow side of the meter gives the true pressure acting on the flood flowing through the outflow cannula and into the leg. Some of the characteristics of the relationships between pressure and flow in the dog's leg have been described by the author.[4]

To obtain the peripheral effects the drugs should be injected intra-arterially (into the outflow connecting tube) dissolved in the smallest practical volume of saline solution. The doses used should be approximately one hundred times smaller than the usual experimental intravenous doses. Some of the important drug actions with which the student should become familiar are listed below.

Epinephrine before and after an adrenergic blocking agent; acetylcholine before and after atropine; histamine before and after an anti-histaminic agent; isopropyl arterenol; ephedrine; procaine; vasopressin, aminophylline, papaverine, benzyl imdiazoline.

The value of directly determining the effects of drugs on the peripheral blood flow, and the peripheral resistance, should be obvious to all teachers of pharmacology. By means of the simple bubble flow meter this can be readily accomplished as a student experiment or a class demonstration.

Legends

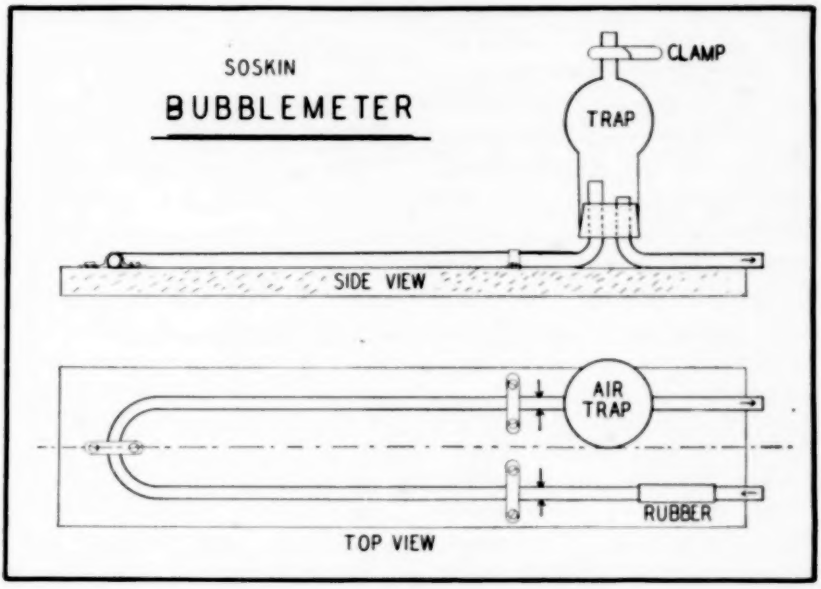

Figure 1. The simple bubble flowmeter.

It consists of a glass tube, 2 to 3 mm. in inside diameter, and a bubble trap of 10 to 20 cc. capacity. A distance is marked off on the tube representing a known volume, 4 to 6 cc., within the tube. A small air bubble, about 0.2 cc., introduced into the tube through the rubber segment by means of a syringe and needle is carried through the metering tube by the flowing blood. The time necessary for the bubble to traverse the distance (volume) between the calibration marks indicates the flow rate directly. The air bubble is trapped and therefore does not enter the circulation. To refill the trap with blood the clamp on the top of the bubble trap is released momentarily.

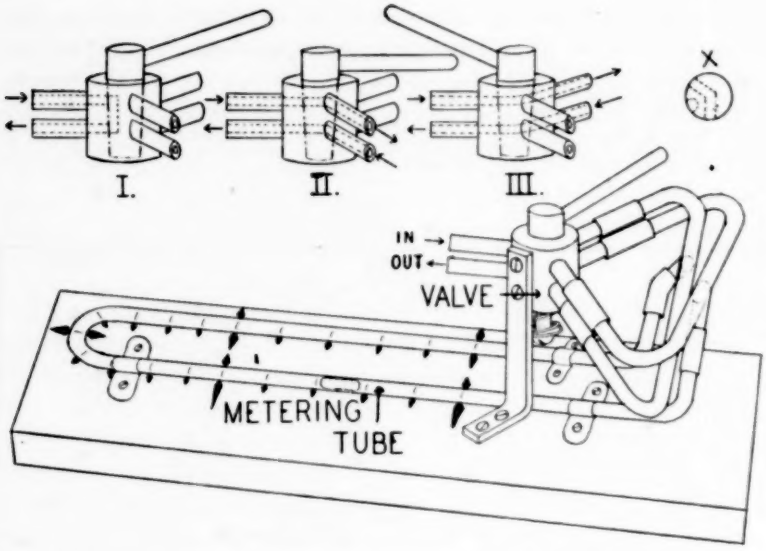

Figure 2. A continuously recording bubble flowmeter.

The reversing valve, made of brass or plastic, is connected to the metering tube by means of two T-tubes. The inflow and outflow cannulae are connected to the valve by means of short rubber tubes. In valve position I the blood is shunted around the metering tube; in positions II and III the blood flows in alternate directions through the tube. The metering tube illustrated is calibrated at 0.2, 1 and 4 cc. intervals. For low flow rates (in rabbits or cats) the passage of the air bubble between the smaller calibrations may be signalled. For higher flow rates each change of valve position at the 4 cc. calibrations may be signalled.

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An Experiment in Stimulating Library Use

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The University of Minnesota

The observation of undergraduate students over a number of years has led to the opinion that, by and large, they have an aversion to the voluntary use of the library to enhance the sum total of their knowledge. The majority of those who do "come in to read" are responding to some mild coercive method such as assigned reading topics, etc. In only a comparative few do we see evidenced a real *desire* to read. Somewhere in the line of our secondary educational system, we have failed to inculcate this desire in the student. The replies to many inquiries indicate that our failure may be due to (1) inadequate instruction in how to use the library, and (2) to the lack of a well formulated program of interest-provoking reading early in the high school period. Unless a student finds out by first-hand experience how many articles of interest are available to him in the library, he will not be disposed to seek the stimulation that he can derive from reading them. Furthermore, if he doesn't know how to use the library so that he can make available to himself the kind of reading he wants, he will not expose his lack of library training to his associates and the librarian. Instead, he stays away. In a recent survey of undergraduate use of the library conducted by the University of Minnesota Library, one of the means of improving library service which was most frequently suggested was "more instruction of new students in the use of the library."[1]

It is of minor importance where we point the finger to blame for this lack of elementary but nevertheless fundamental instruction in library use, nor should we deplore too specifically someone's lack of effort to inspire a desire to read. However, the facts remain that vast numbers of high school graduates enter supposedly institutions of higher learning with little or none of the two attributes mentioned. As a result, it has been necessary to teach college freshmen how to use the library (which can be done be-

*Charles H. Rogers is dean and Mary Agnes Wolfe is the librarian, College of Pharmacy, University of Minnesota.

cause it is largely a mechanical process) and also to attempt to create a desire to read ((the outcome being doubtful because it is dependent upon the student's imagination, predetermination, and willingness to "drink when led to the trough"). It is regrettable that time must be taken from university studies to teach elementary material of this sort, but the problem has been placed squarely in our laps. Without such training a high school graduate is no more fitted to pursue university work than one who registers for college algebra without elementary training in that subject.

While we do not believe that sudents entering the College of Pharmacy of the University of Minnesota are any more deficient in this basic training than those who enter other colleges, we have attempted to compensate in a measure for those deficiencies by first giving a short course in how to use the library with actual "laboratory" work and secondly, to "hypo" students with suggested interest-provoking reading lists, gradated from first to fourth year students. The number of hours that can be devoted to the former is obviously inadequate, but the course outlined below as given by a qualified librarian, a graduate of the Division of Library Instruction of the University of Minnesota, has had satisfactory results.

As part of the orientation course given each fall for pharmacy freshmen, time is allotted for instruction in the use of the library and pharmaceutical literature. After some experimentation it has been found that the "lecture-laboratory" method is the most satisfactory. The first class hour consists of a lecture for the entire class on (1) the use of the card catalog, and (2) on the important pharmaceutical reference books, texts, and journals. Students are told how to look for a book in the catalog, shown the types of cards it contains and the information found on them, and the Dewey Deccimal System is explained briefly. A short history of the *U. S. Pharmacopeia, National Formulary*, and the early textbooks is covered, and other reference books such as the *U. S. Dispensatory*, the *Pharmaceutical Recipe Book*, the publications of the American Medical Association, and the periodical indexes are also mentioned. The pharmaceutical journals are classified as to the type of material they contain (scientific, professional,

and trade journals) and examples of each are given.[2-5] Needless to say this lecture could be extended to two or three hours if time permitted. As it is given here, it serves mainly to point out what will be seen more clearly in the "laboratory" period which follows it. For this period it is necessary to divide the class into groups of 25-30 students in order that the library can accommodate them. Form I is an example of the type of worksheet which is given to each student at the beginning of the period. It will be noted that the questions are arranged so that while part of the group are using the catalog, the others can be looking around the library for the names of the journals and reference books required in the remaining questions. Before filling in the worksheet, another exercise on finding the different types of catalog cards is carried on. One drawer from the card catalog is given to each group of three students along with a set of 5 cards on which are typed the words "title," (i.e., Cinchona in Java); "author" (Fieser); "subject" (Carbohydrates); "see" (cross reference); or "see also" (additional subjects for reference). The problem is to find an example of each kind of card in the catalog drawer and insert in front of it the corresponding card from the typed set. The librarian then checks each drawer to see if the proper distinction has been made among the different kinds of catalog cards. This exercise helps to show more clearly the vast amount of information one can find in the card catalog and the various catagories under which one may look for what he needs. Throughout this period the librarian is available if needed for further explanations and individual help.

Form I

Pharmacy 1f—Library Assignment

1. Use the card catalog and the **Periodical Index*** to find one book and one article on this subject: .....** Give the following information:

Book

Author — Call Number
Title — Date Published

Article

*A card file arranged by subject of articles from the current pharmaceutical journals compiled by the librarian.
**Various subjects which can be found in both files are written in.

Title of article
Name and date of periodical

2. **Titles of four professional pharmaceutical journals.**
3. **Titles of two foreign professional pharmaceutical journals.**
4. **Titles of two state or regional pharmaceutical journals.**
6. **Titles and official abbreviations of the two books used as legal standards in the U. S.**
7. **Titles of two other pharmaceutical reference books.**

This "lecture-laboratory" method of instruction in the use of the library as carried out at our college has proven to be quite satisfactory. It is contemplated to supplement this instruction by a bibliographic problem such as the one described in a recent article.[9] By such an exercise, students would be better prepared to use the library to its fullest extent throughout their college careers.

In addition to the course given for freshmen, a statement giving the purpose and rules to be observed in the pharmaceutical library is sent out each fall to all students in the College of Pharmacy. This statement covers the following: the status of the pharmaceutical library and what it contains; the hours it is open and the services available; the purpose for which the library is intended; and what is expected in the way of proper conduct and care of books. Below this statement is a tear-off to be signed by the student expressing his "willingness to cooperate with the Faculty and student body in promoting the usefulness of the library." (Form II)

Form II

College of Pharmacy
Office of the Dean

A Statement About the Departmental Pharmaceutical Library in the College of Pharmacy, University of Minnesota

1. **This library is a part of the General University Library and is subject to the same rules and regulations. It is a repository of the knowledge of the "Art and Science of Pharmacy" accumulated over the centuries. When considered in this light, it should be regarded highly and held in great respect, because**

through it we can make ourselves the recipients of all this knowledge if we make the effort to seek it.

2. On its shelves may be found the works of wise men and masters of Pharmacy, Medicine, Chemistry, etc., both ancient and modern. Some of these are old and rare; most of them, of course, are modern. Each book represents hundreds, perhaps even thousands of hours of patient work and research; often given without hope of personal aggrandizement or reward, yet gladly contributed to the cause of Pharmacy. Multiply these hours by the number of books upon the shelves and the amount of work becomes stupendous and monumental. It is, therefore, important that each volume be handled with reasonable care so as to preserve it and its usefulness for as long as possible.
3. The Pharmacy Library is open to undergraduates from 8:00 a.m. to 5:00 p.m., Monday through Friday when a qualified librarian is in charge. At such times help is freely available on all matters pertaining to the library, such as in finding articles, references, books, and matters of like nature. Faculty and graduate students are provided with library keys making it available to them day or night.
4. Very few instances of misconduct have been observed, especially during the time when the librarian is in charge. Loud talking, visiting, collective studying, and the throwing of hats or clothing upon the chairs and tables are obviously forbidden. Since all students in the College of Pharmacy are provided with clothes lockers, there is no necessity for the bringing of overcoats and hats into the Library, and all students are requested not to do so. In the interest of all students, a "library atmosphere" must be maintained and any misconduct that tends to destroy it must be considered by the thinking person as being due either to thoughtlessness or to a disregard of the rights of others.
5. During the past year, a number of textbooks have disappeared from the reserve shelves. These books are purchased for the use of all students and are the property of the library. Any person found with books in his possession which have not been charged to him by the librarian will be subject to disciplinary action.
6. The library is a place for **individual** study, reference, and research, and for no other purpose. It is not intended for **collective** study, visiting, loud talking, or any other unseemly conduct which distract from its value to others who wish to use it for its proper purpose.
7. If the library is to function at its best, every student must cooperate and see to it that it is quiet at all times, and that proper decorum is maintained. This, for the benefit of all.

Will you please signify your good intentions by signing the following and handing it to the Librarian?

I have read the statement about the Pharmaceutical Library and hereby express my willingness to cooperate with the Faculty and student body in promoting the usefulness of the Library.

Signed.....

Basically, a student must have a *desire* to read or he will not use the library except under duress. Therefore, the question immediately before us is how can we create this desire. First, we must recognize that most students do not realize how much interesting material is available to them in the library. It has all the romance, intrigue, and fictional characteristic of a Jack Merriwell's "thriller". To provoke this interest in reading, we post each month a reading list gradate for all students from the first to the fourth year. For freshmen we lean heavily toward the "interest side" and, having tried to demonstrate how much interesting material the library provides, the character of the suggested articles gradates into the professional and scientific type which have the same interest value but, in addition, a scientific value at the level of the student"s formal professional training. Form III is a sample of the January, 1951 reading list.

Form III

Vitamin L (Literature)* January 1951

Freshmen

The Effects of Atomic Weapons. Revised Sept. 1950. pp. 1-44.

The end of the mad dog menace. **NW Druggist,** 58:26-27, Dec. 1950.

Oil from the earth. By Leonard Davis. **Science Counselor,** 13:128-Dec. 1950.

Sophomores

The Effects of Atomic Weapons. Revised Sept. 1950. pp. 1-44.

Cortisone. By Edward C. Kendall. **Science Counselor,** 13-122-Dec. 1950.

Biological warfare . . . from a comprehensive report authorized by the Department of Defense.

J. Am. Pharm. Assoc. Pract. ed. 11:738-39, Dec. 1950.

The day and night cycle in plant life. By Marguerite Gilstrap. **Science Counselor,** 13-139-40, Dec. 1950.

Juniors

Contact lens solutions. By Harry Hind & Frank M. Goyan. **J. Am. Pharm. Assoc. Pract. Ed.** 11:732-37, Dec. 1950.

Thiacetazone (TBI), an important advance in the chemotherapy of tuberculosis. By D. McAnally. **Chem. & Drug. Export Rev.** 11:47-50, Nov. 1950.

The story of Vitamin B_{12}. By John Valiant. **Science Counselor,** 13:123-, Dec. 1950.

The Effects of Atomic Weapons. Revised Sept. 1950.

Seniors

Insulin resistance, the mechanisms involved and the influence of infection and refrigeration. By James W. Sherrill. **U. S. Armed Forces Med. J.** 1:1399, Dec. 1950.

A comparison of a new astringent agent with such agents now commonly used. By John E. Christian & Glenn L. Jenkins. **J. Am. Pharm. Assoc. Sci. ed.** 39-663-65, Dec. 1950.

Enteric coating of tablets. By Ronald Clarkson. **Drug & Cos. Ind.** 67-776, Dec. 1950.

The Effects of Atomic Weapons. Revised Sept. 1950.

*A catch-title given to the reading list for Publicity purposes.

This experiment in how to create a desire to read was initiated in our college in 1937. The repeat attendance in the library of those who were there because they wanted to read (as judged by the librarian) doubled during the year. Articles in the four categories were recommended by members of the staff, all of whom agreed that there was a definite need for such a program, and had little difficulty in finding ample current material to tie in with their lectures. One professor pointed out the value of the carry-over of a well-developed reading habit from college to a professional career. Although the busy professional man may not have the time or all the scientific journals available, he will discover by becoming familiar with the various pharmaceutical journals, such departments are "Scientific and Practical Abstracts" in the *Northwestern Druggist*, the news items in American Chemical Society publications, etc., which will provide him with abstracts of articles on the latest developments in drug therapy. This effort on the part of our staff to create a desire to read gained national mention in the *Library Journal*. (10) Due to paucity of students and lack of personnel during the last World War, the procedure was temporarily discontinued, principally because there was no way to measure the results obtained, and because any conclusions that might be drawn would not be valid because of the small

sample. However, because there had been sufficient evidence during its initial trial that the method had merit, we have reinitiated it during 1950-51. Careful checks on attendance and personal interviews with students will give us some idea as to the success of the experiment. We believe it is worth trying.

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NEW IN THE FAMILY

Janet Susan Harding.—Born February 1, 1951, daughter of Prof. and Mrs. Donald W. Harding, Purdue University.

Dale Eric Wurster.—Born January 19, 1951, son of Dr. and Mrs. Dale E. Wurster, University of Wisconsin.

Christopher Edward Kalman.—Born February 24, 1950 at Aurora Illinois, son of Mr. and Mrs. (Jean Terry) Edward R. Kalman, first grandchild of Prof. and Mrs. Ralph E. Terry, University of Illinois.

Arthur Maynard Zuppo.—Born January 1, 1951, son of Dr. and Mrs. Arthur G. Zuppo, St. Louis College of Pharmacy and Allied Sciences.

James William Small.—Born January 23, 1951, son of Dr. and Mrs. L. D. Small, University of Nebraska.

Esther Alicia Garcia.—Born March 11, 1951, daughter of Mr. and Mrs. Roberto Garcia at Long Beach, California, nineteenth grandchild and second great-grandchild of Dr. and Mrs. R. A. Lyman, University of Nebraska.

Twenty-Five Years of Pharmacy Graduate Work at Purdue

DONALD W. HARDING AND GLENN L. JENKINS

Purdue University

Graduate work at the Purdue University School of Pharmacy rounded out its first quarter century at the end of 1950. It is of interest to survey the development, areas of work, degrees granted, and the service in the profession of those who participated as students in this program.

The growth of the Pharmacy Graduate Program at Purdue is shown in table I.

Table I

Years (Inclusive)	Degrees Granted M.S.	Ph.D.
1925-1930	2	0
1931-1935	7	4
1936-1940	22	7
1941-1945	11	13
1946-1950	56	44
Totals	98	68

Although 166 graduate degrees were granted, 26 individuals received both the M.S. and Ph.D. degrees at Purdue, so, in all, 140 persons participated in the program. Fifteen women and 83 men completed the requirements for the M.S. and, of these, six completed work for the doctorate at some other university. Four women and 64 men completed the requirements for the Ph.D. degree. The first M.S. was granted in 1925 and the first Ph.D. in 1932. It is interesting to note that the first woman to receive the Ph.D. from the University majored in Pharmaceutical Chemistry.

During the first decade, graduate work was offered in the areas of Pharmacy and Pharmaceutical Chemistry. In 1939, the first graduate degree in Pharmacognosy was awarded. Pharmacology was established as a separate department in 1942, and the first advanced degrees were granted in 1945. During the quarter

century, graduates have been distributed according to major areas as follows: Pharmacy (including Industrial and Hospital Pharmacy) 54, Pharmaceutical Chemistry 61, Pharmacology 20, and Pharmacognosy 6. Minor areas, in addition to the subject matter areas offered in the School of Pharmacy where one minor may be taken (the second minor must be taken in some division outside the School of Pharmacy), have included: Organic, Physical, Analytical, and Biological Chemistry; Chemical Engineering; Biological Sciences such as Bacteriology, Physiology, Anatomy, and Mycology, English, Education, Statistics and Economics.

Where did these students come from? Twenty-two were from outside the United States, including five from Canada, and they had either the B.S. or M.S. degree at the time of their entry. Thirty-two received their B.S. from Purdue and, of these, twenty-one had experience in industry or elsewhere before returning for graduate work. Eighty-six came from forty-three different schools in the United States, and of these, thirty held the M.S. degree at the time of admission.

How did these students finance their graduate education? The records show considerable overlapping; the same individual who held a teaching assistantship for one or two years, often was transferred to a fellowship. Only nineteen of the 140 carried out graduate work without some stipend through University channels. Those who held appointments include: 62 as assistants or instructors, 56 as fellows of the Purdue Research Foundation, and 28 as Fellows of the American Foundation for Pharmaceutical Education. The importance and influence of the A.F.P.E. becomes evident when it is remembered that the first award from this source reported here was made effective July 1, 1946.

What are those who completed graduate work doing? Table II gives the distribution for 113 recipients of degrees living in this country concerning whom information is available.

Table II

Area and Position	Highest Degree M.S.	Ph.D.	Total
EDUCATION			
Administration (Dean, Director, or or Executive Officer)	0	5	5
Professor	3	7	10

Associate Professor	0	8	8
Assistant Professor	6	11	17
Instructor	2	0	2
Post Doctorate Fellow	0	1	1
Graduate work	12	0	12
Totals	23	32	55
INDUSTRY			
Advertising	1	0	1
Product Development and Control	3	7	10
Production	4	1	5
Research	3	14	17
Sales	1	0	1
Totals	12	22	34
PUBLIC HEALTH			
Control	1	0	1
Research	1	3	4
Totals	2	3	5
PHARMACY PRACTICE			
Hospital	1	0	1
Retail	11	0	11
Totals	12	0	12
OTHER			
Deceased	1	0	1
Housewife	4	1	5
Physician	1	0	1
Totals	6	1	7
Grand Totals	55	58	113

Table II reveals that those who completed the Ph.D. degree enter almost exclusively into the field of education or work related to research. Accumulated data not reported here shows that there is a considerable degree of change from teaching to industry, and also from industry to teaching. The data also shows that about 35 percent of the successful M.S. candidates go forward with graduate work or enter teaching with the expectation of completing the work for the Ph.D. degree at a later date.

Data not shown in the tables reveals that the 55 engaged in teaching are in 31 universities and colleges. It also reveals that the 34 engaged in industry are employed in 25 different companies.

The Medicinal Plant Garden of the Massachusetts College of Pharmacy

HEBER W. YOUNGKEN, SR.

Masachusetts College of Pharmacy

In March, 1941, through the efforts of Dean H. C. Newton and myself, the Massachusetts College of Pharmacy acquired the use of about 2¼ acres of land on the Bussey Institution grounds of Harvard University adjacent to the Arnold Arboretum in Jamaica Plain, Massachusetts for the purpose of developing a medicinal plant garden.

Soon after the acquisition of this valued asset, the garden was laid out in rectangular, circular and crescent-shaped beds under my direction with the cooperation of my assistant, Dr. M. W. Quimby. Seventeen beds were prepared by early summer of 1941. Planting began on April 19, 1941, and by early summer 381 different species and varieties of plants, mostly medicinal and aromatic herbs, shrubs, and trees had been established in the garden. Many of the herbaceous plants were grown from seed; some plants were purchased from nurseries; a number were presented by the Arnold Arboretum and by the Bureau of Plant Industry in Washington; and a large number were donated by friends from their old established herb gardens in Lexington, Milton and Winchester.

The garden is financed and operated by the Massachusetts College of Pharmacy and is open to the public for inspection. The purposes of the garden are, (1) to provide added facilities for the teaching of botany and pharmacognosy by enabling students to see and study growing medicinal, oil-yielding and aromatic plants which yield many of our drugs and condiments, (2) to provide some authentic plant materials needed for class work and investigation, (2) to ascertain which medicinal, aromatic and pesticide plants can be grown successfully in this part of New England, (4) to endeavor to ascertain what nutrient and other factors are essential to the yield of drugs of superior quality.

*Presented at the 27th annual meeting of the Plant Science Seminar, Boston, Massachusetts, August 24, 1950.

Facilities for germinating seeds, potting, transplanting and harboring plants have been provided in the greenhouse and cold cellar of the Arnold Arboretum.

The garden now includes 21 beds and a small area of adjacent woodland. Around its border have been introduced a variety of medicinal and ornamental trees and shrubs including sweet gum, witch-hazel, sassafras, elder, callicarpa, viburnums, cascara sagrada, alder buckthorn, buckthorn, white pine, European yew, burning bush, Norway spruce, sugar maple, fringe tree, upland sumac, Rosa gallica, Rosa centifolia, junipers, mezereum, bayberry, and flame azalea. About 390 kinds of plants now thrive in the garden.

In the garden and greenhouse our graduate students in the course on "Drug Plant Cultivation" receive practical training in growing, harvesting and drying medicinal and economic plants.

I will not attempt in the brief time allotted to name all of the numerous native and exotic plants to be found in the garden beds. You will be given an opportunity to see them when you visit the garden, tomorrow.

(The members of the Plant Science Seminar visited the garden the following day.)

Pharmacy Week Awards for 1950 have been announced by Secretary Frank A. Delgado of the A.Ph.A. Public Relations Committee. The $100 prize for the best display entered by a retail pharmacy goes to the Woods Drug Store of Hopkinsville, Kentucky. Certificates of merit went to the Garden Pharmacy of Newport News, Virginia; the Statler Pharmacy of Boston, Massachusetts; the Fayette Drug Company, Baltimore, Maryland; the Griffith Owl Drug Store, Henryetta, Oklahoma; and the Peoples Service Drug Store, East Liverpool, Ohio.

Rutgers University College of Pharmacy received the award for the best exhibit installed by pharmacy students for the Week's observance. Certificates of merit in the college competition went to the University of Utah and the University of Kentucky.

The award for the best public exhibit installed by a pharmacist or a group of pharmacists, elsewhere than in a pharmacy, was won by the Atlantic County (New Jersey) Pharmaceutical Association for an exhibit in the display windows of the Atlantic City Electric Light and Power Company.

The President's Page

These days all college administrators are receiving innumerable pamphlets, circulars and news letters discussing the Korean war situation and its impact on military inductions and student enrollment. Reams of material have been written on this subject and unfortunately almost every piece of literature sent out presents a different opinion or view-point.

Our newspapers too have published many articles and editorials which vary from dire predictions of empty colleges next fall to statements proclaiming that the war will have little or no effect whatever on future college student numbers. In public speeches and private conferences Washington and military officials concerned with such matters have likewise shown a similar divergence of views and opinions. No doubt some of these statements are in the nature of "trial balloons" and are intended to feel the pulse of public reaction and to measure the possibility of free educational groups. Other view-points may be expressed simply in the nature of propaganda in behalf of pressure groups and still others may only be so much political hash. If college deans believe everything they read and hear they view the future with a feeling of complete assurance one day and of mournful pessimism on the next.

This condition of uncertainty is also reflected in communications and inquiries which I have received as President of our Association from representatives of many of our member colleges. They refer to certain articles or statements which come to their attention and want to know whether they can rely upon them. Clearly a state of confusion exists which is hampering the continued progress of strengthening our schools of pharmacy.

But, if our deans are confused, what about the state of mind of our students now in attendance and of those young people who planned to enter college next year? The uncertainty of their position is often creating in them a feeling of complete frustration. In the last war many of our students sought enlistment in the middle of their college career and then found that they had to wait for long periods of time before they were called. Now again

numerous students are withdrawing from our colleges to enlist in the armed forces largely because of a desire on their part to end their feeling of uncertainty and to bring matters to a conclusion.

We know from experience that such interrupted college courses greatly handicap the students concerned. Many of them never return to college and therefore they are at a disadvantage for the rest of their lives. Others who do return find great difficulty in again adjusting themselves to an interrupted college career.

Our students, both present and prospective, need our guidance and advice in these matters. The present selective service policies provide for the deferment of our students until the end of school years. This provision definitely shows a desire on the part of our law-makers to give special recognition to college students. Provisions for the further deferment of at least a limited number of qualified students is a certainty. Furthermore, the Defense Department has indicated that it would prefer to take boys in the 18-year category and hence the colleges will probably retain a substantial portion of the 200,000 students now scheduled to be inducted during the summer of 1951. There also appears little likelihood of inductions of married men and of veterans. A calm and considered review of the situation would therefore indicate that we will retain a very large proportion of our present student bodies. We should give this information to our students and advise them that the Defense Department would prefer to have them remain in the college at least for the present school year and until further provisions for possible future deferment have been promulgated.

A recent bulletin of the American Council on Education has also given specific figures indicating that even with inductions from the 18-year-old group this should have little effect upon our incoming classes. It makes the following points:

A. **A maximum of 50% of the typical male freshman class would be 18 or older.**

B. **Defense Department spokesmen have testified that the armed forces could absorb, in the first year, only 60% of the available 18-year-olds, and**

C. **Induction could take place only during the 3 summer months, since the bill provides that students becoming eligible for induction during a college year shall not be inducted until the end of that year.**

This would indicate that not more than 7½% of the prospective male freshmen would be affected this summer. The actual percentage should be less, since 10 to 20% of high school graduates are unqualified for military service for one reason or another. High school graduates of 1951 now applying for admission to our colleges can therefore safely be told that the chance of their induction during the summer months are relatively slight.

I cannot close without stating that the officers of the A.A.C.P. have tried to keep in close touch with all matters pertaining to developments in the manpower and student situation and to properly present the special role which pharmacy holds in the military and civilian health fields. The American Pharmaceutical Association has been of great assistance in these efforts and we will continue to do all that is possible to further the interests of our profession.

HUGO H. SCHAEFER

The Education Service of the National Foundation for Infantile Paralysis has asked us to print a series of **Do's** and **Don'ts** for people to observe now as the polio season approaches. We have made a selection because of limited space but further information and the reason for each Do or Don't may be obtained by addressing the Foundation at 120 Broadway, New York 5, N. Y.

Do allow children to play with friends they have been with right along but keep them away from new people.

Do wash hands carefully before eating and always after using the toilet and keep food clean and covered.

Do watch for signs of sickness such as head ache, fever, sore throat, muscular stiffness, extreme tiredness and nervousness.

Do put a sick person to bed, away from others, and call a doctor.

Don't get over-tired by hard play, exercise or travel.

Don't get chilled or bathe or swim long in cold water or sit around in wet clothes.

Don't have mouth or throat operations during a polio outbreak.

Don't use another person's towels, dishes, tableware or the like.

Don't take children to places where there is polio: ask your health department for advice.

Don't take your child out of camp or play ground where there is good health supervision.

The Editor's Page

In this issue of *The Journal* appears a paper entitled "Predicting Success in Pharmaceutical Education" by Dr. H. H. Remmers and A. J. Drucker which embodies the results of the Senior Comprehensive Examinations in The Pharmaceutical Survey study. It was Dr. Elliott's original plan to publish the examination questions upon which the paper was based along with it, but some objection was raised by some members of our Committee on Curriculum. It was felt that it would weaken the value of the tests if the examination questions were made public. The Editor does not follow the reasoning. It is not biblical to light your candle and put it under a bushel. According to the same formula to create a comprehensive examination and then place it behind the iron curtain does not make sense.

It seems to me that this comprehensive examination to which the seniors have been subjected, is a test of our efficiency as teachers. I think the chief value of a test in the classroom in any subject is not for the student to make a grade for himself but to be so constructed as to make it a teaching tool. If it does not have a teaching value it might just as well be discontinued. In my own experience I never gave an examination by which I thought I had done justice to the student. I always felt as if I should raise his grade so as to cover my error and give the student the benefit of the doubt and not harm his record.

There are approximately 100 pages of these questions, typewritten, single spaced; some times double-column. They cover four subjects: pharmacy, pharmaceutical chemistry, pharmacognosy, and pharmacology. I have studied these questions from the viewpoint of subject coverage. They set a pattern which any teacher might profit by in constructing examinations to test the student's knowledge of a subject and a pattern that would be valuable in constructing examinations in other subjects. How many of us are there who will say we don't need the educative process applied to ourselves.

Furthermore, one of the commonest adverse criticisms I have heard in my almost half a century of contact with pharmaceutical educators is that state boards of pharmacy don't know how to give examinations. Often that criticism has been applied in reverse. It is evident that the educative process might be improved for students if both educators and board members were subjected to an educative process involving the building of comprehensive examinations. I believe the publication of these examinations would be a worthwhile project and I hope there will be a demand on the part of educators for such publication.

Talking about patterns. Through the courtesy of Dr. B. Olive Cole, the Editor received a program of the annual alumni association entertainment of the School of Pharmacy of the University of Maryland which was held at the Hotel Emerson on February 14, 1951. In the program is recorded some of the activities and accomplishments of the Association since its reorganization in 1926, from which we abstract the following items:

Since 1926 the Alumni Association has paid $25 or $35 per year for pages in the Terra Mariae, the annual student publication of the School.

Since 1927 the Association has cooperated with the faculty in entertaining each succeeding graduating group at a dinner and dance at commencement time.

Since 1927 the Association has provided a $100 scholarship annually for a graduate student.

In 1930, when the new building was dedicated, the Association contributed $2500 to assist in building up the library.

In 1939 members of the Association and the faculty provided an oil painting of Dean A. G. DuMez for the Sshool.

In 1941 the officers and members of the Association were active in promoting the Centennial Celebration of the School contributing $200 toward the expense of the celebration. Also, at that time, a research fund for fellowships amounting to $2796.50 was collected by a committee of the Association.

In 1943 the Association presented the School with a service honor roll bearing the names of more than 350 who served in World War II. It was completed in 1946.

In 1947, the Association in cooperation with the Maryland Pharmaceutical Association and the Baltimore Retail Druggists Association gave the annual commencement dinner to the graduates and to the

returned veterans of World War II, a total of 350 persons and presented Wm. J. Lowry, who graduated from the Maryland College of Pharmacy just 50 years before and who was the first president of the reorganized Association, a handsome pen and pencil set.

In 1947 the Association prepared, printed, and distributed a four page Alumni News Letter which was sent to all members of the Association. Beginning in this same year the fraternities and sororities were included as guests at the commencement entertainment.

In 1948, the Association presented an oil painting of Dr. B. Olive Cole to the School and a suitable gift to Dr. Henry E. Witch upon his retirement after many years of service. Also in 1948 the Association sponsored a luncheon for the Lambda Kappa Sigma Sorority when the Biennial Convention was held in Baltimore.

In 1949 the Association presented the first annual Alumni Award to Dr. H. A. B. Dunning and the second to Dr. Robert L. Swain in 1950.

In 1949, a check for $1000 was presented to the Maryland Pharmaceutical Association for the E. F. Kelly Memorial Building.

In October 1949 the Association sponsored a reception at the Emerson Hotel in honor of the new dean Dr. Noel E. Foss and his wife.

In 1950 the Association presented the 1950 key of the Association to Honorary President Judson H. Sencendiver and donated $400 to the School to match a similar amount from the American Foundation for Pharmaceutical Education for scholarships.

The Association has collaborated with the general Alumni Assosiation of the University of Maryland in preparing material for Maryland, the publication of the general Alumni Association and also in securing members for the Baltimore Club of the University of Maryland.

What an inspiring record of moral and financial support by an alumni association for its alma mater! What a pattern for the rest of us to follow! What more need be said?

A page in the program bears this inscription, "The Alumni Association wishes to take this opportunity to pay tribute to Dr. H. A. B. Dunning for his tireless and persevering efforts in bringing the plans for an E. F. Kelly Memorial to fruition." There are a lot of us who would like to pay a similar tribute to Dr. H. A. B. Dunning for his same kind of effort for American pharmacy on the national level.

As every pharmacist, who reads the bulletins emanating from the office of the Secretary of the American Pharmaceutical Association knows, Dr. Robert P. Fischelis has opened the door

of every public health agency and government activity to pharmacy. He has brought a dignity and opened up opportunities of service it has never before enjoyed. Where it formerly did not have even a toe-hold it now has a leg-hold and in many instances it has become a part of the torso. He has taken the pharmacist out of the handmaiden class and given him independent status where in all cooperative procedures he is an individual to be reckoned with. Along with the last bi-monthly kit in the series of health information material devoted to the fight against heart disease, he makes this statement and request of every pharmacist. "It is very important, in order that we may know how to plan similar programs in the future, that we receive an expression of opinion from you as to the value of this educational work. We would like to know whether you think it should be continued." Our reaction is that it would be catastrophic if it is not. When Bob Fischelis' service is ended and the crown is placed upon his head, that service we are talking about in these lines will be the brightest star in the constellation.

An incensed young dean recently called the Editor's attention to an article in the December 18, 1950 number of the Journal of National Association of Retail Druggists entitled, "Curricula of the Pharmacy Colleges," by John C. Jones and Lloyd Y. Smith. If this article had appeared in the New York Times or the Baltimore Sun or any lay paper or magazine it would have brought down the wrath of every pharmacist in America. But appearing in a prominent place in the official organ of one of our largest professional groups it seems to have passed practically unnoticed. Perhaps our thoughtful druggists have thought it wasn't worth paying any attention to and if so we are inclined to think they are right. It is interesting to learn however that Jones and Smith are pen names. Perhaps the authors were ashamed of their own production and did what the criminal does who is dodging the police. However we must say that pharmaceutical education does not deserve such treatment at the hands of a publication representing a great body of retail pharmacists. It is most unfortunate for any member of the pharma-

ceutical press to publish an article that attempts to make ridiculous the educational program of the profession it professes to serve.

In the October 1950 issue of *Frivol*, a magazine of collegiate life published by the State University of Iowa, is the first of a series of profiles of prominent faculty members of that institution. The subject of the first profile is none other than our own beloved Dean Emeritus Wilbur J. Teeters who is characterized as "Iowa's No. 1 football fan". The magazine devotes an entire page to a photograph of the rugged dean and the better part of a page and a half to a record of his accomplishments. Running true to form and in keeping with the spirit of the times, Dean Teeters is lauded for his interest in athletics and extracurricular activities within the University and for his civic interests in his home town. We recognize the importance of all these and do not in anyway mean to detract from them but we wish to commend the Dean for his long and productive and none-the-less spectacular labor in bringing to fruition a teaching program within his University that raised the education of a pharmacist above the training of the trade school level. And while that was being done he carried the fight beyond the borders of his state and stood for the same objectives in the national arena. After he retired from administrative duties in 1937, unlike many retired deans, he developed no symptoms indicating bitterness. He turned to one of his early loves that was close to his heart, namely, toxicology, with all the vigor and freshness of a youth in his twenties and is still serving his state in the capacity of state toxicologist. Moreover, since his retirement from the deanship, he has made a record never attained by any other pharmacy dean, or for that matter by any other kind of dean. He has served two terms as mayor of Iowa City and is now serving as an alderman. As a good Republican and as a follower of the immortal John Wesley, he has a burning zeal for what is clean and decent in city government. Well may we pray for more men bearing the brand of the amazing Wilbur John Teeters.

Some discussion has arisen as to the need of doubling the annual membership fee of the American Association of Colleges of

Pharmacy. Some have felt this to be unnecessary but if it is they want some tangible and justifiable reasons for doing so. In this they are absolutely right.

No one, perhaps, except the members of Executive Committe, who are at the center of Association activities, can appreciate the increased obligations placed upon the Association. It is impossible to dwell upon these at any length within the limits of an editorial. The best that can be done is to mention a few concrete examples

It is no exaggeration to say that the work and the responsibilities of the Chairman of the Executive Committee and the Secretary of the Association has trebled in the post-war years. Fortunately for the Association, the Chairman is so located that the university which he serves also supplies the Association with a vast amount of clerical and stenographic service. The probabilities are that the office of the Chairman will long be so favored. But this is not so in the case of either the Secretary's office or that of the Editor of the *Journal*. In both instances it has been most difficult, on a part-time or an hourly basis to obtain efficient office assistance to satisfy the essential demands.

It should be remembered, also, that there has been a great increase in the cost of supplies and the printing of the *Journal*. When publication of the *Journal* was begun in 1937 the cost was $2.20 a page. The per page cost of the current issue is $10.77. Continued publication of the *Journal* has been made possible by the fact that the American Foundation for Pharmaceutical Education has so far made a contribution to take care of the deficit within a certain limit but that does not relieve the Association from doing its share.

Not only has the rate cost of travel increased but the necessity for some of the officers to attend special meetings in several places including Washington in the interests of pharmaceutical education has been imperative and the future has more of this in store for us. This year the absolutely necessary travel expense far exceeds what was planned in the budget.

In the meantime The Pharmaceutical Survey has been completed. Working with our own Committees, Dr. Edward C.

Elliott has greatly expanded our horizon and set a new one. Our own committees must carry on that work. In the past, comparatively small sums have been allowed to several committees such as the Committee on Curriculum. There are other committees the work of which would be more effective if funds were available for clerical work and for occasional meetings of the personnel for conferences. The life of the Association depends upon the effectiveness of its committees' efforts.

For a number of years the Association has been mulling over the problem of acquiring a permanent paid secretary. The Editor has not been wildly enthusiastic in support of it. In the first place he has not been able to visualize where the money could be obtained to employ a man who would be able to make a worthwhile contribution for less than $15,000 annually for salary, office and travel expense. In the second place, he is concerned over the effect upon the production of leadership by turning responsibilities that produce leadership over to a paid staff. Pharmaceutical education has reached its present stage because of the unselfish efforts of those who teach. Be that as it may, our present problem is to obtain sufficient funds to carry our work forward. The work itself must still be very largely a labor of love.

Mr. Leonard H. Powers, a retail pharmacist of Omaha and president of the Nebraska Pharmaceutical Association has been appointed a members of the Omaha Sanitation Commission by the Omaha City Commissioners. In this position Mr. Powers has the opportunity to help shape the health program of a metropolitan area. It is a recognition not only of the fine citizenship of the appointee but of the service the profession of pharmacy may render. To those who are inclined to worry about the status of pharmacy all one has to do is to peep over the horizon of his own little isolated foxhole and he will find that pharmaceutical practice as well as pharmaceutical education is on the march.

RUFUS A. LYMAN

Notes and News

University of Arizona.—A considerable amount of new equipment has been purchased for pharmaceutical chemistry. Included is a polarioscope, a sodium vapor lamp, a titrimeter and potentiometers..—A Graybar telephone system has been installed in the dispensing laboratory.—The Zonta Club's scholarships of $200 each have been awarder to Sonja Te Velde and Lorraine Proctor.—The departments of chemistry and physics in cooperation with the college of pharmacy have installed a departmental library in the Pharmacy-Chemistry-Physics building.—The first alumni chapter of Rho Chi in the United States was installed in Tucson with Dean Roy Bowers of the University of New Mexico acting as installing officer. Dr. Willis R. Brewer of the college of pharmacy was elected the first president.—Dean Troy C. Daniels and Dr. Edward C. Elliott inspected the school in January. Dr. Elliott addressed the student branch on March 1.

University of Southern California.—Dean Alvah G. Hall has been reappointed a member of the state board of pharmacy for another four-year term by Governor Warren.—Prof. Edward S. Brady has been elected president of the American College of Apothecaries for the current year.—Through the efforts of the Alumni Association a $1,200 Beckman Spectrophotometer has been purchased for the school.

University of Colorado.—Alpha Theta chapter of Rho Chi has begun the publication of a monthly newsletter for distribution to alumni, the purpose of which is to keep alumni in closer touch with each other and with the school.—In March, Dr. G. A. Valley, chief bacteriologist for the Bristol Laboratories, addressed the faculty and students on the general topic of antibiotics and told of some of the problems in the large scale production of these drugs and outlined research methods which are being used in the search for new ones.—The Pharmacy Wives Club is meeting at the home of its sponsor evenings, making clothes for distribution to under-privileged children.—Mr. Tony Lembach of the Upjohn Company and Mr. Henry Rames of Parke, Davis recently addressed the class in commercial drug products.

University of Connecticut.—At a special convocation in February, President Albert N. Jorgensen spoke on "The University's Responsibility in a National Crisis" and presented prizes to six students for excellence in scholarship. Dean H. G. Hewitt read the names of 40 students who made the dean's honor list the first semester.—On recommendation of the Executive Committee of the Graduate School. President Jorgensen has authorized the implementation of the program for the doctorate in pharmacy as submitted by the Graduate Study Committee of the College of Pharmacy. Programs will be offered in

pharmacy, pharmaceutical chemistry and pharmacognosy leading to the Ph.D. degree.—A series of lectures intended to bring to the pharmacists of the state the latest techniques and pharmaceutical advancements made during the year, began on March 26 and will be continued for six weeks. The series is sponsored by the school and the state association.—Six students have been recently elected to Rho Chi.

Creighton University.—Frank Ferraro, instructor in the biological sciences has been appointed to the animal hospital committee of the medical school.—Dean W. A. Jarrett recently addressed the seniors of all the Omaha high schools on pharmacy as a career.—In the second television show sponsored by the college of pharmacy, Mrs. Ann Czerwinski demonstrated the effect of various drugs on the turtle's heart.—The junior and senior classes recently made the annual visit to the Eli Lilly plant.—Included in new apparatus recently received is a wire recorder, a Fisher electrophotometer, and a DuNouy interface tensiometer.—New members of the local chapter of Sigma Xi include Dean W. A. Jarrett, Mrs. Ann L. Czerwinski, Frank Ferraro, and Sebastion Pirruccello of the pharmacy staff.

Drake University.—Drs. C. Boyd Granberg and James R. Weeks have joined the pharmacy staff. Dr. Granberg, who took his undergraduate work at the South Dakota State College and his graduate work at the University of Illinois, has been appointed associate professor of pharmacy. Dr. Weeks, B.Sc. in Pharm. University of Nebraska, did his doctorate work at the University of Michigan, was appointed as associate professor of pharmacology and pharmacognosy.—The curriculum which was reviewed last spring to provide wide elective areas in scientific and retail pharmacy, has been partially implemented. The implementation will be entirely completed by the fall of 1952.—The students have petitioned for a chapter of Rho Chi.—Prof. J. Earle Galloway was the faculty chairman of the Second Annual Alumni Reunion which was held on April 18.—Miss Maxine Beatty, laboratory assistant in pharmacy, has accepted a commission in the Medical Service Branch of the Air Force.

University of Florida.—Dr. L. G. Gramling was elected national president of Gamma Sigma Epsilon Chemical Fraternity at the biennial convention held in Chattanooga, Tennnessee, in December.—The following were granted the Ph.D. at the February commencement: Ross M. Baxter, whose dissertation was entitled "Active Constituents of Clitocybe subilludeus" and is now assistant professor of pharmaceutical chemisty at the Ontario College of Pharmacy in Toronto; Edwin D. Corkhuff, who worked on "Isolation of Plant Constituents", and is now a research chemist for William S. Merrill and Company at Cincinnati; and Byron B. Williams, whose subject was "A Study of the Toxicity and Local Anesthetic Properties of Some Derivatives of Cumic Acid'", and is now assistant professor of pharmacology at the Alabama Polytechnic Institute.

The George Washington University.—The staff gave a refresher course for pharmacists of the metropolitan area in February. The topics discussed were of the most practical nature for drug store service and operation.—Approximately 50 students visited the E. R. Squibb and Company plants in Brooklyn, New York, and New Brunswick, New Jersey, in March.—The Kappa Psi fraternity initiated 15 pledges in February.—Dr. S. J. Greco, assistant professor of pharmacy has been elected president of the City of Washington branch of the A.Ph.A.

The University of Georgia.—Six pharmacy students have been admitted to Phi Kappa Phi.—Charter Day was observed on January 27, commencing the celebration of the 150th year of the life of the University of Georgia and the 47th of the School of Pharmacy. The Rho Chi Society constructed a display which depicted the pharmaceutical activities of 150 years ago and those of the present day.—Drs. Joseph P. LaRocca and Woodrow R. Byrum have recently been awarded a research grant from the University Center in Georgia for pharmaceutical studies on new compounds related to chloral hydrate.—Five students and two faculty members, Frank Dobbs and Charles Hartman, were initiated into Rho Chi on February 22.—Dr. Seale Harris of Birmingham, Alabama, gave the principal address celebrating the Crawford W. Long Day on March 30. This celebration is sponsored annually by the Georgia Chapter of Rho Chi.—Dr. John Stegman of Athens was guest speaker at the February meeting of the student branch. His subject was "The Relationship Between the Doctor and the Druggist" and he urged that better cooperation between pharmacists and physicians depended upon their knowing each other personally.—George McClure, a senior pharmacy student has been named in "Who's Who Among Students in American Colleges and Universities".—Twelve members of the 1950 graduating class have become licensed in Georgia.—Twenty students made the dean's list for the fall quarter 1950, which meant a grade of of 90 or above. Miss Jane Heng had a straight "A" which was the highest grade made by a woman student in the whole university.

Howard College, Birmingham.—Mr. Homer Hollifield, president of the Birmingham Retail Druggists Association and one of the Civil Defense directors for the city, spoke before the student branch on February 1, on the part of the pharmacist must play in the Civil Defense program.—Robert H. Day, A.B., in chemistry from Willamette University and B.S. in pharmacy from Howard, has been engaged to teach Drug Store Management.—On March 1, Mr. Lawrence E. McNeil of Birmingham, spoke before the student branch on the subject "What One Should Know About Professional and Business Insurance".—Ralph Stone, a recent Howard graduate, has become the first resident in Hospital Pharmacy and Vanderbilt University. This program was established through the efforts of Mr. R. S. Bond, chief pharmacist at the

hospital.—Dr. C. Lee Huyck addressed the March meeting of the Tri-cities Retail Druggists' Association, speaking on the subject, "Two Great American Pharmacists".

State University of Iowa.—Dr. Harris Isbell, director of research, Public Health Service Hospital, Lexington, Kentucky, addressed the student body on February 20 on the subject, "Clinical Manifestations of Drug Addiction".—Dean Emeritus Wilbur J. Teeters presided over the Veterans Druggists' Luncheon which was held in connection with the annual convention of the Iowa Pharmaceutical Association at Des Moines in March. He was reelected president for the ensuing year.—Two women and ten men have recently been elected to membership in Delta Chapter of Rho Chi.

University of Illinois.—Mr. Charles R. Walgreen has been presented a scroll in recognition of his services to the College of Pharmacy as a member of the Advisory Committee of the University. The scroll acknowledged Mr. Walgreen's services to the Committee, services which were performed at great personal sacrifice, during his five year membership. The presentation was made by Dr. A. C. Ivy, vice-president of the University in charge of the professional schools in Chicago.—Contracts have been awarded for the construction of a green house and head house units of the Drug Plant Experimental Station, located near Lisle, immedaitely east of the Morton Aboretum. The building will be erected on an eleven acre plot now being used by the College for the purpose of conducting a program of research on the growing of domestic plants from which drugs are obtained. Research at the station will eventually involve plant chemistry, plant breeding, pathological studies of plants, and studies of insecticides, rodenticides, and fungicides under the direction of the department of pharmacology and pharmacognosy, and the graduate school.—Prof. Paul D. Carpenter has been elected to serve as academic representative of the Chicago Professional Colleges on the University Advisory Committee of the Retirement System.—There are four Watt brothers who are registered pharmacists in Illinois. Three are graduates of this college and operate their own pharmacies in Springfield. The fourth brother serves as treasurer of the Illinois Pharmaceutical Association.—Mr. Ralph A. Carpenter of Villa Park and Mr. Thomas G. Crawford of Chicago have been appointed to the Advisory Committee of the College.—Prof. H. L. Davis of the chemistry department is convalescing after chest surgery.—At a recent meeting of the health organiations of Chicago and the State of Illinois, it was announced that the University was preparing to make an increase of 33 per cent in its undergraduate enrollment in dentistry, medicine, and pharmacy, in order to relieve the present shortage of health personnel in the state and to meet man power requirements of the armed forces and the civil defense program. This cannot be done however without increasing laboratory and class room facilities. In

order to do so the University is asking $6,340,000 from the General Assembly of the state to provide for the construction of a six-story classroom and laboratory building. If this is granted the medical registration will be increased from 166 to 200 per class, dental registration from 75 to 90 per class, and pharmacy from 125 to 200 per class. Dr. Ivy pointed out that recent surveys indicate that there is an acute shortage of doctors, dentists, pharmacists, and nurses in Illinois, particularly in the sparsely populated areas down state. The situation is even more critical because the number of Illinois residents who are graduating from all professional schools in the nation today is not enough to offset the replacements needed in this state.

University of Kansas.—A petition for the establishment of a chapter of Rho Chi at the School of Pharmacy has been approved and installation ceremonies are scheduled for April.—On February 1, Dr. Raymond Hopponen of the department of pharmaceutical chemistry spoke before the Organic Chemistry Colloquim on the subject of "Cardiac Glycosides".—A group of juniors and seniors visited the Parke, Davis plant in January.—Mr. Desmond Gibson, instructor in pharmacy, has been called to active duty in the Navy and his place is being taken by Homer Scarborough, '50, for the remainder of this term.—Dean Reese attended the Sixth District meeting at Little Rock, Arkansas, in March. —The student branch put a Pharmacy Week display in the Round Corner Drug Store window and received a certificate of merit for the exhibit.

The University of Kansas City.—Mr. Horace Kimbrel, secretary of the Board of Trustees, addressed the Executive Committee of the Alumni Association recently and outlined the possibilities for the Association to reorganize for the purpose of receiving contributions for the operation and maintenance of the School of Pharmacy. The plan was approved unanimously. The last issue of the Alumni News of the University carried a pictorial story of the activities of a pharmacy student from registration to graduation.—At the annual meeting of the Animal Health Pharmaceutical Association held at Little Rock, Arkansas, in March, Dean Dittrich spoke on the subject "Veterinary Pharmacy as a Curricular Subject in Pharmacy".—Fifteen students were graduated at the end of the first semester.—The junior and senior classes visited the Lilly and the Parke, Davis plants in March.

Long Island University.—Mr. Stephen Gador, M.A., who was a Sternan Research Fellow at Columbia University during 1945-1946 and since that time has been associated with the Bios Laboratories, has joined the staff of the department of chemistry.—Prof. Ralph H. Cheney presented a paper entitled "Functional Life Spasm of Arabacia Gametes in Methylated Xanthines" before the Psysiological Section of the American Association for the Advancement of Science at the Cleveland

meeting. Prof. Cheney was also re-elected a member of the National Council of the Association for the year 1951.—The Alumni Association is sponsoring a program to commemorate the 60th anniversary of the pharmacy college at which awards will be made to Messrs. Edward Neimeth and Nicholas S. Gesoalde of the Board of Trustees, and Dean Hugo H. Schaefer and Prof. Joseph S. Goldwag of the faculty for their untiring efforts in behalf of the college of pharmacy.

University of Maryland.—Andrew Bartilucci, Helen V. Reed, Jacob S. Hanker, and Jeffie G. R. Langston have received American Foundation Fellowship grants.—Judson H. Sencindiver, honorary president of the Alumni Association contributed $400 which was matched by an equal amount from the American Foundation for scholarship. Henry A. Santoni and Karl G. Wagner are the recipients for the current year. A senior, James B. Walter, Jr., was awarded the Charles Landon Memorial Scholarship.—Findlay A. Morrison, assistant professor of pharmacy at the University of British Columbia is enrolled for graduate work in pharmacy.—John Autian, Joseph Kaiser and Isadore Raichlen are new laboratory assistants who are also pursuing graduate work.—The annual alumni dance and entertainment was held on Feburay 14 at the Hotel Emerson. The next project of the association will be that of providing a portrait of Dr. E. F. Kelly and furnishings for the reception hall of the Kelly Memorial Building which will be erected by the Maryland Pharmaceutical Association. The proceeds of the annual entertainment, the sum has not yet been announced, will be used to further this project.—Miss Georgianna Simmons Gittinger, of the department of pharmacology, who reads and speaks Spanish fluently, has been appointed a collaborator for the Second Pan-American Congress of Pharmacy to be held at Lima, Peru, in December 1951. Miss Gittinger traveled in Europe in the summer of 1950, spending most of the time in England and France and a week end visit with friends in Stuttgart, Germany.

University of Minnesota.—The 14th Continuation Study Course in Pharmacy was held February 19-21 with 70 pharmacists in attendance. Guest faculty members were Dean A. H. Uhl, and Drs. L. W. Busse and L. M. Parks of the University of Wisconsin. Following the final dinner the annual Melendy Memorial Lecture was given by Prof. J. A. Wise of the Institute of Technology.—At the fall quarter commencement exercises, Gollakota Krishnamurty of India and Alfred Chow were awarded Ph.D. degrees.

University of Mississippi.—Dean E. L. Hammond, on February 21, spoke before the high school students of Grenada, Mississippi, on "Pharmacy as a Profession". His talk was one of a series on vocational subjects arranged by students of the Grenada High School.—On March 1, in connection with the observance of Religious Emphasis Week at the University, Dr. William G. Pollard, executive director of the Oak

Ridge Institute of Nuclear Studies, conducted a seminar on the theme "Limitations of Science as a Faith".—Dr. Frank H. Eby, Grand Regent of Kappa Psi, inspected Beta Rho chapter on March 15.—Dr. W. T. Summerford, of the United States Public Health Service at Savannah, Georgia, was a recent campus visitor and obtained a number of organic compounds synthesized by Drs. S. F. Clark and A. A. Dodge which will be tested for insecticidal activity.

Montana State University.—An institute was conducted on the campus on March 13 and 14 in order to assist the pharmacists of the state in becoming acquainted with the new products and procedures. Profs. T. G. Call, C. B. Bryan, and Mr. F. C. Hammerness are all making plans for further study toward their doctorate the coming year.—A multiple die tablet machine has been installed in the manufacturing laboratory.—The student branch has raised funds for the purchase of photographic equipment for the pharmacologic laboratory.

University of Nebraska.—Dean J. B. Burt attended a meeting of the American Council on Education in Chicago in January for the purpose of discussing student enrollment, deferment, and pharmacy man power problems. In March, he attended the Sixth District meeting of Boards and Colleges at Little Rock, Arkansas.—James E. Dusenberry, instructor in pharmacognosy, was recently elected secretary of Province 5 of Kappa Psi.—Dr. Samuel I. Fuenning, director of the Student Health Service, has been appointed to the pharmacy staff as associate professor of public health.—Thirty-three juniors and seniors visited the Eli Lilly plant at Indianapolis in March.—"The Effects of Low Concentration of Cyanide on Growth and Respiration in Pelomyxa carolinensis-Wilson" is the title of a study by D. M. Pace and B. W. McCashland published in the January issue of the Proceedings of the Society of Experimental Biology and Medicine.—Dr. Jerome Ritter is the author of an article entitled "Myocardiac Insufficiency Complicating Pulmonary Insufficiency" which appeared in a recent issue of the Nebraska State Medical Journal.

University of North Carolina.—Nine students were initiated into Rho Chi during the winter quarter.—A recent inspection by the American Council on Pharmaceutical Education gave the School of Pharmacy an A rating.—The pharmacy staff prepared the floor plans and selected the equipment for the dispensing and manufacturing divisions of the University Hospital now under construction.—Prof. H. O. Thompson, during the winter quarter, gave a course in pharmacology for the students in nursing at the Watts Hospital in Durham.—Construction on the North Carolina Institute of Pharmacy building—which will include offices for the North Carolina Pharmaceutical Association and for the North Carolina Board of Pharmacy, together with auditorium and reception facilities—is nearing completion. This building is near the School of Pharmacy building and will enable the school to maintain the close

relation to the state association which it has always enjoyed. Professional seminars and the pharmacy extension services also will be greatly facilitated.

Ohio State University.—Dr. Howard J. Jenkins who received the Ph.D. in Pharmacology in December has accepted a research position with Armour and Company in Chicago.—Dr. Lloyd E. Harris attended the Section on Medicinal Chemistry of the American Chemical Society in April at the Cleveland meeting.—Dr. Amos B. Colby spoke before the Summit County Pharmaceutical Association in Akron on March 5, on the subject "Recent Drugs Used in the Treatment of Rheumatoid Arthritis.—Xi Chapter of Kappa Psi was host for the biannual convention of Province 4 held at the College of Pharmacy on March 31.—Dean B. V. Christensen who is chairman of a special committee for the Revision of Constitution and By-laws of the A.Ph.A., was host to the committee on March 22-23.—New equipment includes a circular Barcroft-Warburg apparatus with revolving monometer assembly; an autotechnicon automatic tissue processing apparatus; and a 28″ x 28″ constant temperature water bath with full visibility.

Oregon State College.—At its regular meeting in January, the Oregon State Board of Higher Education gave formal approval to a proposed five-year program of study, leading to the baccalaureate degree in pharmacy at the Oregon State College, to become effective at the end of the current academic year.—The manufacturing, pharmaceutical chemistry, and pharmaceutical preparation laboratories have been extensively remodeled and redecorated and a new reference library for students has been provided.—Miss Ruth Seid, B.S., 1950, University of Washington has been appointed a part time instructor in pharmacy and will work toward an advanced degree.—Grant M. White, B.S., 1950, University of Utah has accepted a graduate assistantship in the department of pharmacy.

Philadelphia College of Pharmacy and Science.—Prof. H. P. Frank was the honor guest at the Mid-Winter Alumni Dinner celebrating his more than 25 years of service on the pharmacy staff.—President Ivor Griffith has returned to his office after an absence of two months on account of illness.—A new mural, the gift of the late trustee, George F. Applin, has been placed in the library. It is the fifth in a series of 14, which when completed will depict the history of writing.—Ten students from the school attended the Eastern Science Students' Conference at Yale University early in April.—The Student Council, and the general student body, raised enough funds to provide two television sets which were presented to the patients of the Valley Forge Hospital of the United States Army.—The Breyer Ice Cream Company offers a $450 freshman competition scholarship for a high school student graduating in 1951. The company also offers a scholarship for a student in

each of the upper classes based on the student's record of the previous year.

Purdue University.—On December 12, 1950, the half-millionth prescription was filled in the "Model Pharmacy". The first year the Pharmacy was in operation five or six prescriptions were filled daily, while at present the average is over 300 hundred per day. The prescriptions are filled by senior students and each one is checked by one of the seven graduate pharmacists on duty.—Zakaria Ahmed, Ph.D., '48, from Fouad University, Egypt, has been appointed as a research fellow.—Nine girls have been initiated into Kappa Epsilon recently.—Dr. John T. Goorley, '34, operates the Laboratories Goorley, Casilla de Correo 4010, Buenos Aires, Argentine.—Twelve students and one faculty member have recently been initiated into Kappa Psi.—Nine members of the staff had a part in the presentation of papers at the Cleveland 1950 meeting of the American Association for the Advancement of Science.—At the January commencement the following master's degrees were awarded: Mrs. Minora Miya, major in hospital pharmacy; Mrs. Carmen K. Lefforge, major in pharmaceutical chemistry; Patrick Belkastro, major in industrial pharmacy; and Joseph P. Buckley, major in pharmacology. The doctorate was conferred upon Lewis C. Lappar and Ernest W. Grant, both majors in pharmaceutical chemistry.—New graduate students entering for specialized work in February were H. R. Patel from Gujarat University, Bombay, India; W. Howard Hassler, from the University of Tennessee for major work in hospital pharmacy; and Hugh C. Ferguson, a former graduate student, to continue work toward the doctorate in pharmacology.

Rutgers University.—At the annual initiation dinner of Rho Chi, 15 undergraduate, 2 graduate students and 2 faculty members were admitted to membership.—Dr. Frank B. Mekes, former secretary and treasurer and the only living founder of the college, having been with it from the beginning in 1896, has retired.—In presenting the first annual report of the Rutgers Pharmacy Extension Service, Director Louis E. Kazin announced that over 500 separate visits had been made to retail drug establishments in the state. In cooperation with the State Pharmaceutical Association, the state's pharmaceutical industries and drug wholesalers and the Board of Pharmacy, the objectives and scope of the Extension Service have been well publicized. Over thirty meetings have been addressed by the Director, upon subjects of great interest to those operating stores. In addition, the Pharmacy Extension news letter has been sent to every pharmacy in the state.—On April 7, the student branch conducted an all-student conference at the college building. The theme of the conference was, "The Pharmacy Student Views His Profession". Here are some of the subjects discussed: Should We Set Up a Grievance Committee to Govern Our Ethics? Are the Laws Governing Pharmacy Equitable and Enforceable? The Phar-

maceutical Curriculum. Does Retail Pharmacy Offer Professional Satisfaction? What Must We Do to Stimulate New Fields of Endeavor for Pharmacy Students? Is Pharmacy Gaining Proper Recognition in Government Service? Do Pharmaceutical Organizations Properly Serve Their Membership? Are Our Inter-Professional Relations Workable? These subjects are most interesting because they indicate what our students are thinking about. Students from the following schools took part in the discussions: Brooklyn College, St. John's College, University of Connecticut, Fordham College, Temple and Columbia Universities, and the Philadelphia College of Pharmacy and Science.

Medical College of the State of South Carolina, School of Pharmacy.—One hundred six students are enrolled for the current session.—Don E. Tillery, a graduate of the Alabama Institute of Technology who has had two years of service in the Navy and a member of Rho Chi, has been appointed associate in pharmacy.—Dean W. A. Prout has been appointed a member of the Executive Committee of the South Carolina Pharmaceutical Association.—Two students have recently been elected to Rho Chi.—Twenty-eight students visited the Upjohn and Eli Lilly plants in January.—Eight students made the dean's honor roll (maintaining an average over 90%) the first semester.—Mr. Barton Culp of the chemistry staff has assumed the post of Grand Council Deputy of the Iota Chapter of Kappa Psi.

Southern College of Pharmacy, Inc.—The Alumni Association has made plans for holding annual meetings in Atlanta on Commencement Day and on Founders Day in October.—The Georgia Pharmaceutical Association entertained the faculty and the students at a dinner on March 9.—During March, both faculty and students donated blood to the Atlanta chapter of the Red Cross.—Approximately 70 seniors will be graduated next June.

University of Tennessee.—Eleven students were granted the bachelor's degree at the March Commencement.—Thirteen members of the current senior class have been initiated into Rho Chi.—Miss Shirley Foster, '47, M.S. Wisconsin '50, is now teaching at the College of the Ozarks, Clarksville, Arkansas.

University of Texas.—The father of Dr. W. R. Lloyd passed away at his home in Pueblo, Colorado on January 29, 1951.—The third annual Hospital Pharmacy Seminar for the state was held in April.—Forty seniors were graduated at the close of the first semester.—Approximately 412 students are enrolled the current semester. A dozen have been lost, having withdrawn to enter the Armed Forcs.—Dr. and Mrs. Lloyd conducted the seniors on a trip to the Parke, Davis, the Abbott Laboratories and the Walgreen Drug Company in Chicago during the Easter vacation.—Dr. S. G. Mittestaedt is giving a new course this semester in Animal Health Pharmacy.—Eight members of the staff attended the meeting of District No. 6 in Little Rock, Arkansas in

March.—Five seniors were elected to membership in Nu Chapter of Rho Chi in March.—Seven new members including one member of the faculty, Dr. W. R. Lloyd, have been elected to membership in Kappa Psi.—The faculty has approved the five-year program leading to the bachelor's degree and is currently engaged in developing an appropriate and acceptable curriculum.—Seven graduate students, including four instructors, are now enrolled in the graduate school. The graduate committee is considering a graduate program leading to the master's degree in hospital pharmacy.

University of Utah.—Parke, Davis and Company have recently installed an all glass display case of a new style in the college lobby for the exhibition of their products. It was designed by the Company's representative, Walter Bigden, in cooperation with Dean L. David Hiner. The slanted front has the **"Medicamenta Vera"** motif etched in the glass. A number of other schools have requested duplicates.—The student branch furnished the musical part of the program following the banquet of the Utah Pharmaceutical Association Mid-winter Convention. The branch also sponsored the drug store window display which received an award of merit from the A.Ph.A. Pharmacy Week Committee.—Dr. Edward A. Swinyard has been appointed to the Civil Defense Committee for the Salt Lake Area.—Dr. Swinyard, with the assistance of faculty and students and with the Research Committee of the Utah Pharmaceutical Association, cooperating, is conducting a prescription study. The prime purpose of the study is to determine the frequency of use of certain proprietary preparations.—A local group, Phi Upsilon, consisting of 25 men have organized for the purpose of becoming the nucleus for a national pharmaceutical fraternity later in the year.—Dean Hiner spoke recently before the Men's Club of the Wasatch Presbyterian Church on the "Medicinals of the Bible". Dr. Jack Orr has recently been elected an elder in the church for a three-year period.—The entire pharmacy staff were recent guest speakers at a luncheon meeting of the Executives' Club of Salt Lake City.—Since the Squibb plant is located too far from Salt Lake for the convenience of student travel, on February 15 the firm brought the plant to the university through Squibb representatives by means of talks and moving pictures. The plan was very instructive.—Upon invitation of the Kiwanis Club, which sponsors the Annual Guidance Conference, several members of the pharmacy staff took part in the Conference held in Salt Lake City high schools.

University of Washington.—The school received a class A rating following an inspection by Drs. Elliott and Deno.—The second annual postgraduate refresher course for pharmacists was held on March 5 and 6. Despite the snow storms which blocked many roads, over 100 pharmacists attended. The subjects discussed were antiarthritic and antianemic drugs, antibiotics, new drugs in gastric ulcer therapy, mar-

keting problems, current status of ammoniated dentifrices, current status of antihistaminic cold cures, new drugs in hypertension and arteriosclerosis, amino acid therapy, and radiation effects and defense.—Fourteen students visited the Lilly and Parke-Davis plants in March. The local druggists, wholesale houses and associations contributed generously to lessen the cost to students for the trip.—The College was host to 250 druggists while they took the Red Cross first aid course in February.—A plan has been executed for converting the University Medical School into a 1000 bed emergency hospital to take care of bombing casualties should occasion arise. The pharmacy faculty will staff the pharmacy and be responsible for manufacturing the necessary parenteral solutions.—Six faculty members are also members of various branches of the Armed Forces Reserve; two are in the Navy, two in the Army and two in the Public Health Service.—Daniel P. N. Tsao has completed his research on "Plant Growth Regulators and Glycoside Formation" for the doctorate; Stephen Sim has completed the study on "The Effects of Amino Acid Feeding on Alkaloidal Formation in Ergot" for the master's.—Recently Dr. Youngken addressed the Pierce County Retail Druggists Association on the subject of anti-arthritic drugs. Dr. Plein spoke to the Puget Sound Hospital Pharmacists on parenteral solutions and Dr. Rising spoke to the Lake Washington Rotary Club on anti-biotics.

Washington State College.—Fifty-two junior and senior pharmacy students made a visit to the Lilly, Parke-Davis, and Abbott plants in February.

Wayne Univerity.—Prof. Ralph J. Mill has been placed in charge of the newly created department of pharmaceutical administration which includes courses in the marketing of drug products, pharmaceutical accounting, pharmacy management, pharmaceutical jurisprudence, and commercial orientation.—Instructor **Albert R. Pisa**, who is also a retail druggist and a member of the Detroit Board of Health, has been elected president of the Board.—Mr. Thoburn Wiant, Detroit public relations director of the Young and Rubicam, Inc. Advertising Agency, spoke before the students recently on the subject, "How Public Relations Contribute to the Success of Business and Industry".—Mr. Jerome Schimmel, a graduate student majoring in pharmaceutical bio-science, has been provided with various strains of antibiotic organisms by the National Regional Research Laboratory.

University of Wisconsin.—James L. Jones, who holds an M.S. in library science from the University of Illinois, has been appointed full-time librarian as the latest step in developing a working pharmaceutical library separate from collections in the main University library.—Investigations of analytical procedures for paracepts has been started under a grant from the Heyden Chemical Company.—New research equipment will soon include a special solubility determination apparatus

designed by Dr. Takeru Higuchi.—New photomicrographic equipment is being obtained through funds supplied by the Chemical Specialties Company.—Dr. George Urdang has been selected by the American College of Apothecaries to receive the 1950 Lascoff Award for his contributions to American professional pharmacy. It will be presented to Dr. Urdang at the next annual meeting in August in Buffalo, New York. Dr. Urdang has also been notified of his election as honorary member of the Society of the History of Pharmacy in Spain.—The American Institute of the History of Pharmacy will mark its tenth anniversary by a special historical program at the University in May.—The following staff members, with their subjects indicated, participated in the Fourteenth Continuation Study Course in Pharmacy at the University of Minnesota in February: Dean Arthur H. Uhl (prescription tolerances); Dr. Lloyd M. Parks (chemistry of cortisone and ACTH); and Dr. Louis W. Busse (new ointment bases and lotion vehicles).—Dr. Parks gave the University Founder's Day address before the alumni meeting at Tomah, Wisconsin, in March.—Those participating in the April meeting of District 4, and their subjects were: Dean Uhl (panel on the advisability of five separate departments by 1952 by the A.A.C.P.); Dr. Busse (development of a program combining college training and controlled experience); and Dr. Melvin W. Green (criteria for selection, progression, and graduation of students).—Richard E. Raake has received the Borden award for the highest average in pharmacy during the first three years of study.—Five undergraduates have received scholarship grants from the Wisconsin Pharmaceutical Association; two have received the awards offered by Kappa Psi, and five students have received appointments to temporary survey positions with the Abbott Laboratories on the basis of academic records.

University of Wyoming.—A special course, entitled "Study Skill Techniques" has been offered during the fall and winter quarters by the Department of Personal Guidance. Pharmacy students who have taken it say it has aided them greatly in their school work.—A new ball mill machine has been added to the equipment of the pharmacy laboratory.—A Nash vacuum system, which will serve to furnish a vacuum for outlets in all pharmacy laboratories, was installed during the Christmas vacation.—Kenneth L. Christoferson, a junior pharmacy student, was a winner of the Annual Chemistry Award made by the Wyoming Section of the American Chemical Society.—New equipment in the pharmacy manufacturing laboratory includes a tablet and pill coating machine.

Miscellaneous Items of Interest

A Message from the Executive Committee

To Members of the American Association of Colleges of Pharmacy:

On January 25, 1951, I mailed to all member colleges a notice of proposed amendments to the By-Laws of the American Association of Colleges of Pharmacy which incorporated the Interim Report of the Committee on Constitution and By-Laws as submitted to me by this Committee, which consists of Lloyd M. Parks, Chairman, Elliott E. Leuallen, and Kenneth L. Waters. I also included in the notice a proposal to amend Article II of the By-Laws in order to provide for increasing the annual dues of member colleges from $100 to $200 per year, this change to become effective for the year 1951-52. This proposal originated in a resolution adopted by the Executive Committee at its interim meeting held at Chicago Illinois, on November 13-14, 1950.

It should be noted that Proposals A and B, contained in the Interim Report of the Committee on Constitution and By-Laws, both involve amendments to sections of Article I of the By-Laws which define the Qualifications for Admission to, and Membership in the American Association of Colleges of Pharmacy. Section 12 of Article I provides a special procedure to be followed in amending any part of this article. Special provisions are the presentation of the proposal in writing to the Association at a regular meeting, notification of member colleges by mail at least four months prior to the vote on its adoption and a requirement of a two-thirds majority of all member colleges voting on the proposed change for its adoption.

These special requirements make it impossible to consider any proposal to further amend Proposal A or B at the Buffalo meeting, since any proposal to amend either of these proposals would have to follow the same procedure as that followed in presenting the original proposals. This would prevent final action on any proposed change in the Proposals now before us until the 1952 meeting of the Association. This means that Proposals A and B must either be adopted or rejected at the Buffalo meeting exactly in the form in which they have been circulated to member colleges.

Very recently a question has arisen as to the interpretation of Paragraph d of the proposed amendment to Section 6 of Article I (a portion of Proposal A). The paragraph reads as follows:

"d. These requirements shall be effective on and after July 1, 1956."

A possible interpretation has been suggested to me which is based upon the assumption that Paragraph d applies to the three paragraphs immediately preceding, and that the effective date of July 1, 1956 would, if Proposal A is adopted, prohibit the granting of the Bachelor of Science degree or the Bachelor of Science in Pharmacy degree to any student who had not completed, prior to July 1, 1956, a course of at least five years duration. This interpretation would require the immediate initiation of the five-year course in the fall term, quarter or semester of 1951-52, assuming no acceleration were offered, in order that graduates might be qualified to meet the five year requirement by the effective date of July 1, 1956.

It should be clearly understood that this **is not** the interpretation of Paragraph d which the Committee on Constitution and By-Laws holds, as clearly indicated by the second sentence following Paragraph A which reads as follows:

> "It would make mandatory the adoption of a program of five collegiate years of study, beginning July 1, 1956."

I am certain that the suggested interpretation is not that intended by the proposer of the amendment, nor of the Executive Committee. It seems important to have a clear understanding by all member colleges that the proposed effective date is for the initiation of the five-year program, not for its completion.

A comparison of the changes contained in Proposal A with the existing Section 6 of Article I shows that Paragraphs a and b are unchanged, that Paragraph c has been changed by replacing the words "four-year" with "five-year", and Paragraph d, stating the effective date (of initiation of the five-year program) has been added.

It is true that member colleges would, if Proposal A is adopted, be free to initiate the five-year program at an earlier date if they elect to do so, but the five-year program would not become mandatory until July 1, 1956.

It is also reasonable to suppose that even in colleges initiating the five-year program at the proposed effective date, a limited number of students with two years of transfer credits earned in non-professional schools might be admitted to a school or college of pharmacy at the beginning of the fall term of 1956-57. Such students might qualify for graduation from the five-year program upon the completion of three more years in the school or college of pharmacy, thus receiving their diplomas two years before high school graduates without college credit could qualify for graduation.

It should be noted that the discussion of such possibilities becomes somewhat academic in view of the fact that the same degree is to be granted for completion of the five-year program as has been formerly conferred through the four-year course, and the further fact that diplomas do not, as a rule, state the number of years attended. In

other words, the diploma of the four-year graduate, granted in June of 1956 will probably be an exact duplicate of the diploma issued to the five-year graduate issued in June of 1957.

The origin of Proposal B is clearly explained in the Report of the Committee on Constitution and By-Laws. It was President Schaefer's thought that his resolution would be sufficient to bring about an interpretation of the existing Section 12 without the necessity of amending it. When the Committee on Constitution and By-Laws requested a ruling from me on this matter, I ruled that if the interpretation recommended were to be made effective, then this interprtation would, in effect, be a change in Article 12 made "without due process of law." The presentation of President Schaefer's resolution meets the present requirement of "presentation in writing at a regular meeting" and the circulation of Proposal B in the form and wording in which it is to be voted upon fulfills the requirement of presentation "by mail at least four months prior to the vote for its adoption."

Joseph B. Burt, Chairman
Executive Committee

To Members of the American Association of Colleges of Pharmacy:

Pursuant to the plan outlined in my general letter of March 30, 1951, addressed to member colleges of the American Association of Colleges of Pharmacy, President Hugo H. Schaefer, Dr. Robert P. Fischelis and I conferred on April 9, 1951, with Brigadier General Edward J. Kendricks, Col. Jones and Lt. Col. Larnce at the Pentagon in Washington with reference to the proposed pharmacy technicians' training program.

Dr. Fischelis had made arrangements in advance for the conference with General Kendricks, who is Director of Medical Staffing and Education, Office of the Surgeon General, Headquarters U. S. Air Force. Dr. Schaefer outlined the basis for the objections raised by the A.A.C.P. Executive Committee to the proposed training program and suggested as an alternative a proposal for supplying the needed personnel through voluntary enlistment of pharmacy graduates of the class of 1951.

General Kendricks agreed to endeavor to hold up further action on the proposed plan of the 16 weeks' pharmacy technicians' training program until the Association could determine the number of 1951 graduates who would be willing to enlist for service in the Air Force. It must be understood that the Air Force depends entirely on voluntary enlistment. It does not at present receive drafted personnel. Enlistment is for a four-year period, and there is assurance that those accepted would be utilized in carrying out pharmaceutical duties. They would have the opportunity of earning promotions in non-commissioned rank and of qualifying for commissions in the Medical Service Corps as soon as vacancies occur. The Air Force now has its full limit of commissioned pharmacists.

In addition to qualifying for commissions in the Medical Service Corps as vacancies occur, General Kendricks also stated that qualified persons might become eligible for the competitive officers training corps program of the Air Force. It was brought out in the conference that definite quotas now exist, limiting the number of enlistments in the U. S. Air Force, but in the event that appreciable numbers of pharmacy graduates signify their intention to enlist, special efforts will be made to accept such volunteers, even though the number exceeds the immediate quotas.

In view of the fact that a temporary postponement of the initiation of the pharmacy techniques' training program has been proposed in return for our cooperation in surveying the member colleges to determine the number of June, 1951 graduates willing to volunteer for service, it is imperative that we be supplied with this information promptly.

Will you, therefore, supply me with as accurate an estimate as possible of the number of senior students from your institution who would be willing to volunteer now for induction in the United States Air Force in June, with the understanding that they would be assigned to duty involving pharmaceutical service? We also wish a report of the number of students in the graduating class who are definitely interested in enlisting in the Air Force, but are unable to make a decision at this time. In the event that we are able to show that the immediate need of the Air Force can be filled by voluntary enlistment, we have been assured that the proposed training program will be abandoned.

Prompt action is necessary, but care should be taken in reaching a conservatitve estimate of the number of probable enlistees from your school. If the results from these estimates approach the number of men needed by the Air Force, further details will be sent to you for presentation to those students who may be interested.

I have promised to report the results of this survey to General Kendricks in the very near future. Will you, therefore, return the enclosed report form by **air mail provided that it is mailed not later than Saturday, April 14?** If your report has to be delayed beyond this date, **please report by telegram, mailing the complete report blank by air mail as confirmation.** In no case will reports received after Wednesday, April 18, be of value. It is suggested that records be kept of the names of the students reported in each category as described in Paragraphs 1 and 2 of the report blank. It is possible that the Air Force may later ask for these.

As you know, the Air Force is a growing and very desirable branch of the service. Practically all of the men volunteering for this branch are college men. We, therefore, have an unusual opportunity of integrating pharmacy students and pharmacists with the highest type of military personnel and yet have them assigned to professional duties

in the field for which they are prepared. We can also spare the profession of the future some difficult problems which are bound to arise when college trained men in other fields are taught pharmaceutical techniques and later seek an opportunity to apply them in civil life.

Joseph B. Burt, Chairman
Executive Committe

University of Nebraska
April 10, 1951

The Program for the Fifty-Second Annual Meeting of the American Association of Colleges of Pharmacy, Buffalo, New York, August 26-28, 1951

The program is in preparation but cannot at present be given in detail. The form of the program will be identical with that of previous meetings.

The Teachers Conferences will be held on Monday, August 27, at 9 A. M.

The joint banquet of the A.A.C.P. and the N.A.B.P. will be scheduled for Monday evening.

The Executive Committee meetings will be scheduled for Saturday, August 25, beginning at 10 A. M., and 2 P. M., and on Sunday, August 26, at 9:30 A. M.

The Committee on Audio-Visual Education is planning an exhibit of equipment as teaching aids in a room in close proximity to our meeting room. It is also probable that they will have available a film on laboratory technique of some kind for the teaching of pharmacy.

The authors who present papers, either in the general meetings or in the Teachers Conference, should present the **original** copy, typewritten, double spaced, and in the exact form they wish them to appear in **The Journal.** Frequently carbon copies, scarcely legible, written in sentence form instead of paragraph, with pen or pencil notations inserted, evidently intended to guide the author in making comments as he presents the paper, have been sent to the editor. Such papers are **not** suitable for publication.

Call for Papers for the Pharmacy Subsection Meeting of the American Association for the Advancement of Science

The next meeting of the American Association for the Advancement of Science will be held in Philadelphia on December 26-31, 1951. The program of the Pharmacy Subsection of the Medical Sciences is being made up. Six sessions of our Subsection will be held.

Authors who wish to present papers before the Subsection are requested to send in titles of papers **as soon as possible.** All titles for inclusion in the printed program must be in my hands by **September 15.**

The following information relative to the presentation of papers is given for your guidance:

1. The need for lantern for standard slides, blackboard or chart hanging facilities should be indicated when the title is submitted.
2. Papers should require not more than 20 minutes for presentation, although the paper for publication may be longer.
3. Three copies of a 100 to 200 word abstract of each paper should be sent in by October 1. These are used by the General Secretary and the Subsection Secretary for the preparation of news releases and reports.
4. An original and one carbon copy of the paper in form for publication should be turned in at the time of the meeting.
5. Papers may be released for publication in the journal of the author's choice. If release is not requested, papers will be submitted to the **Journal** of the American Pharmaceutical Association, Scientific Edition.

Members are invited to attend the meetings of the Section on Medical Science, Subsection on Medicine, and the Section on Chemistry.

Arrangements will be made for advance registeration. Advance registrants will be sent a copy of the General Program before the meeting. See **Science** or **Scientific Monthly** in late August or September.

Please call this request for papers to the attention of your colleagues. Send titles to:

Glenn L. Jenkins, Chairman, Subsection Np,
Purdue University, Lafayette, Indiana

The Tenth Anniversary Celebration of the Birth of The American Institute of the History of Pharmacy

The program will feature a historical conference on The History of the Application of Science in the Health Field. The place: Play Circle, Memorial Union, University of Wisconsin. The program will begin at 9:30 A.M. on May 10, 1951, and end with a 6:30 dinner. The program follows:

Introduction, Arthur H. Uhl, chairman.

"Applied Science in Medicine," George Rosen, editor, **Journal of the History of Medicine and Allied Sciences.**

"Applied Science in Chemical Industry," Harry M. Leicester, editor, **Chymia.**

Lunch and tour of the University of Wisconsin School of Pharmacy.

"Applied Science in Inventions," Abbott P. Usher, professor-emeritus Harvard University.

"Applied Science in Pharmaco-Botany," Frans Verdoorn, editor **Chronica Botanica.**

"Applied Science in Pharmacy," George Urdang, professor of the history of pharmacy, University of Wisconsin and director of the A.I.H.P.

Visit to the University Library and exhibit of herbals.

Dinner, Old Madison Room, Memorial Union.

Director George Urdang announces that the Annual Meeting of the A.I.H.P. will be held on May 9, 4:30 P.M., Room 301 in the Chemistry Building.

He urges all members to attend this meeting, since there will be an election of officers and council. There will also be an important discussion of the future of the institute, based on the successful completion of the first decade of a unique American movement within pharmacy, devoted to research and activities in the historical-cultural sphere.

The 1951 Teachers' Seminar on Pharmacology

To Deans and Directors:

The American Foundation for Pharmaceutical Education has again made funds available to the American Association of Colleges of Pharmacy to underwrite a seminar for the improvement of instruc-

tion. The 1951 Seminar will be a Teachers' Seminar on Pharmacology and Related Subjects. It will be held at Purdue University, Lafayette, Indiana starting at 9 A.M. Monday, July 9, and ending at 12:00 noon, Saturday, July 14.

Housing facilities convenient to the Seminar center will be available with rates of $25 to $30 for room and board in the Residence Halls for Men and Women. The Purdue Union Club provides facilities for rooms with private bath varying from single at $3.50 to $4.50 per day to twin bed rooms at $5.75 to $6.00 per day. Room rates include bedding, towels, limited maid service, soap, etc. The Union Club also provides cafeteria, coffee shop, and restaurant service.

The program is now in process of preparation. It is proposed to confine the Seminar to the subject of Pharmacology and Related Subjects. Topics to be included are: The Undergraduate Course: didactic instruction, laboratory instruction, prerequisites; Emphasis will be placed on what to teach and how to teach; Use of Audio-visual Aids; Special lectures; Round table discussions; Graduate Work and Research in Pharmacology and Related Subjects; Syllabi of Didactic and Laboratory Courses; Laboratory Demonstrations; Layout of Laboratories; Care of Animals; Cost of Operating a Pharmacology Department; and other subjects.

It is hoped that considerable prepared material will be available for distribution to those registered at the Seminar. After the Seminar a complete report on the various subjects will be distributed to all registrants, member-colleges, and others. It is expected that this Seminar will lead to the improvement of instruction in pharmacology and establish a sound basis for courses offered in the curricula of our teaching institutions, will lead to better education, and to better qualified men for teaching and research.

All administrative officers and directors are urged to call this Seminar to the attention of interested persons and to plan to have their organization represented by one or more individuals. It is especially urged that graduate students who expect to enter the area of teaching be encouraged to attend the Seminar. Additional information pertinent to the program and pre-registration will be made available in the near future. You are requested to call the attention of pharmacologists in industry, medical schools, and other centers to this Seminar which will be open to pharmacologists from any school of pharmacy, school of medicine, pharmaceutical industry, or institution of public health in the United States and Canada.

The Seminar Committee consists of Deans J. B. Burt and H. H. Schaefer, Drs. K. K. Chen and L. D. Edwards and Prof. L. C. Zopf.

The host institution needs to know, approximately, how many to plan to accommodate. You are asked to send the names of those in

your organization that may be interested to Dean Glenn L. Jenkins at Purdue University in order that further information may be sent them in the near future.

There is no registration charge—no fees—minimum room and board charges.

Glenn L. Jenkins
Chairman, Teachers' Seminar on
Pharmacology and Related Subjects

April 2, 1951

Abstract of the Minutes of the January 24, 1951 Meeting in New York City of the Executive Committee of the American Foundation for Pharmaceutical Education

In opening the meeting, President C. S. Beardsley gave an informal report in which he referred to the continued progress of the Foundation, its new home and its increased strength as a result of recent additions to the Board of Directors. He also emphasized the importance of further development of the Foundation's placement bureau activities and the proper publicizing of this service to the donors, present and prospective.

Acting Secretary Little reported that the Foundation was now well settled in its new home at 1450 Broadway, New York 18, N. Y., and that the new quarters are attractive, practical, and well suited to Foundation needs. Considerable sentiment was expressed in favor of restricting Foundation Fellowships to two years of graduate work, but there was no unanimity of opinion as to whether such help should be given in the first and second years or in the second and third years. Dr. Little reported upon a number of other matters that had to do with the routine of the Foundation's work.

Treasurer S. P. Penick pointed out that during 1950 contributions to the Foundation amounted to $106,849.57 whereas disbursements totaled $202,379.53, expenditures exceeding income by almost 100%.

In the latter part of 1950 it was necessary to sell $50,000 worth of government securities to maintain the necessary bank balance. The Treasurer reported that the bank balance as of December 31, 1950, was $57,124.98 and that securities held in custody of the National City Bank of New York amounted to $640,000 par value as of December 31, 1950. Mr. Penick recommended continued economy in Foundation affairs and a stepped-up program of solicitation of funds with a goal of $250,000 year collections. The committee discussed and approved a number of suggestions made concerning the routine handling of Foundation funds.

The appointment of a new Foundation Director was discussed and definite action deferred awaiting certain developments. As to the collection of funds, Treasurer Penick reported that approximately $70,000 in contributions had been received since December 18, 1950. President Beardsley stated that he would appoint a committee to arrange for the April meeting which should have some unusual features designed to stimulate greater contributions to the Foundation in their continuing campaign for funds during 1951. The budget for 1951-1952 was given further consideration, but final action was delayed until the April meeting.

Mr. Penick stated that the idea of establishing a Newcomb Fund had been conceived previous to Dr. Newcomb's death and discussed with him at various times. Dr. Newcomb had expressed himself as favoring the establishment of such a Fund, its purpose to be the encouragement of study and research in pharmaceutical botany and pharmacognosy. Through the activity of a small group of Dr. Newcomb's friends, the Newcomb Fund now totals about $16,000. The Executive Committee voted an equal amount of money to the Fund, which is to be known as The Edwin Leigh Newcomb Memorial Fund, and provision was made for the handling and for the protection of the Fund. The principal of the Fund is to be kept intact to the best of the Foundation's ability and the income from it is to be used, where practical, to encourage study and research in pharmaceutical botany and pharmacognosy.

Adjournment took place at 3:30 P. M.

Abstract of the Minutes of the February 16, 1951 Meeting of the Board of Grants of the American Foundation for Pharmaceutical Education

The meeting was held at the new office of the Foundation, 1450 Broadway, New York 18, N. Y.

Chairman Dr. Guy Stanton Ford spoke of the great loss the Foundation had experienced through the death of Dr. Edwin L. Newcomb and expressed the desirability of the establishment of a fellowship in his honor. This sentiment was concurred in by the entire Board. Acting Secretary Little reported on the Memorial Fund that the Foundation had created. Chairman Ford expressed the wish that suitable resolutions relative to Dr. Newcomb's contribution to the Foundation and its Board of Grants be incorporated in the Minutes of this meeting. This suggestion met with the approval of all members of the Board and the Acting Secretary was instructed to see that this was done. Such resolutions were attached as a part of these minutes. Dr. Ford also suggested that the Fellowship might be of a higher denomination than the usual Fellowship awarded for graduate work in the field in which Dr. Newcomb was especially interested, pharmaceutical botany and pharmacognosy, and that the award for this Fellowship might be recommended to the Board of Grants by a special committe made up of outstanding men in that field. Although no definite action was taken, the sentiment of the Board was strongly favorable. The suggestion will be called to the attention of the Board consideration and action.

of Directors and referred back to the Board of Grants for further

The recent re-examination of colleges of pharmacy by the American Council on Pharmaceutical Education, and subsequent grouping into A, B, and C colleges was discussed by the Board of Grants. It was pointed out that such a listing would prove helpful to the Board in passing upon the qualifications of applicants for Foundation Fellowships.

The application blank for Foundation Fellowships was re-examined and revised and the Acting Secretary was instructed to proceed with the printing.

A number of other routine matters were disposd of.

The following Fellowship renewals, which had been passed upon by Chairman Ford and other members of the Board by mail since the June 24, 1950 meeting, were confirmed: Jack N. Bone, University of

Washington; Jack T. Bryan, University of Florida; Hugh C. Ferguson, Purdue University; Louis Malspeis, University of California; Thomas W. Schwarz, University of California; Daniel Peh Nien Tsao, (foreign) University of Washington.

The following new applications for renewals were granted: Glenn H. Hamor, University of Minnesota; Joseph Sinsheimer, University of Michigan; John G. Wagner, (school not indicated); H. Abu Shady (foreign) University of Minnesota.

Adjournment occurred at 4:00 P. M.

New Books

The Dispensatory of the United States of America, 1950 Edition; by Arthur Osol, Ph.G., M.S., Ph.D., Professor of Chemistry and Director of the Department, Philadelphia College of Pharmacy and Science, Editor-in-Chief, and George E. Farrar, Jr., M.D., F.A.C.P., Associate Professor of Medicine, School of Medicine, Temple University, with the collaboration of E. Emerson Leuallen, D.Sc., Professor of Pharmacy, Columbia University; Heber W. Youngken, Sr., D.Sc., Professor of Pharmacognosy and Biology, Massachusetts College of Pharmacy; Willard F. Verweg, Sc.D., Director of Bacteriological Research, Sharp and Dohme, Inc.; and David E. Detweiler, V.M.D., M.S., Assistant Professor of Pharmacology, School of Veterinary Medicine, University of Pennsylvania: with Horatio C. Wood, Jr., M.D., Ph.M., Professor of Pharmacology, Philadelphia College of Pharmacy and Science, Advisory Editor. Complete in two volumes, bound in one cover. Volume One: Based on the Thirteenth Revision of the United States Pharmacopoeia, The National Formulary, Eighth Edition, and the British Pharmacopoeia, 1932, and its Addenda. Volume Two: Being a commentary of the new drugs introduced in the Fourteenth Revision of the United States Pharmacopoeia, The National Formulary, Ninth Edition, The British Pharmacopoeia, 1948, as well as the new drugs not officially recognized. Twenty-fourth Edition. 2057 pages. J. B. Lippincott Company. Price $25.00.

To attempt to review a book that has lived through more than a century, has been edited by men who are among the most distinguished in the field of pharmacy and medicine, and has been published through all the years by one of the most substantial of publishing concerns, seems to be a preposterous undertaking. The United States Dispensatory has become a classic.

The tremendous increase in research and discovery of new uses for old drugs has made it necessary to expand the descriptions in

many fields. For example, in the 23rd Edition of the Dispensatory, 22 lines were devoted to a discussion of Penicillin, while in the present edition 2300 lines were required to summarize the present essential information. The portion of each monograph dealing with the therapeutic usage and dosage has been explained and a reference file of 266 domestic and foreign journals was prepared and reviewed by the editorial staff. As the result of a poll among several thousand users of the 23rd Edition, it was decided to discontinue verbatim quotations from the official standards and summarize the official tests and assays wherever they are provided. In case of the assays the summary is of an interpretive form, the essential steps being explained. Another feature is the inclusion of drugs marketed under various distinguishing trade names or trade marks of the manufacturer or distributor, which enables physicians and pharmacists to identify such drugs immediately. Also a section has been introduced dealing with the uses and doses of drugs used in veterinary medicine. Both veterinarians and pharmacists will find in this section an authoritative source of information concerning such drugs.

Placing the commentary on new drugs that are official in the new United States and British compendia in Part Six and those that are new but not official in these compendia in Part Seven of Volume II, makes the latest information more quickly accessible to the busy practioners of medicine and pharmacy.—R.A.L.

Pharmacology and Therapeutics, by Arthur Grollman, Ph.D., M.D., F.A.C.P., Professor of Pharmacology and Chairman of the Department of Physiology and Pharmacology; Professor of Medicine and Chairman of the Department of Experimental Medicine, The Southwestern Medical School of the University of Texas. 1951. 828 pages. 104 illustrations. Lea and Febiger. Price $10.00.

As might be expected, the general plan, the manner of approach, and even the style of writing and the type of binding and printing are mindful of the famous Cushny Text which was a standard text in the field of pharmacology in our medical schools, as was Howell's textbook of physiology in its field, for the best part of half a century. The reviewer of the new text is grateful to the author for having done this very thing for it recalls the pleasures of forty years of teaching medical and pharmacy students and justifies him in his contention that in his day the Cushny text was a superior teaching text in the field. If one of Cushny's services to clinical medicine can be placed above the others in importance, it is the fact that he separated those drugs that had value in clinical medicine from those that were of little or no worth. He also included in every edition a study of some drugs which were of little value in therapy but of great importance in the study of the basic principles underlying pharmacological science. Dr. Grollman has followed the same policy and it can best be stated in

his own words from the preface which we quote here. "Although emphasis has been placed on the pharmacology of therapeutically important drugs, others of purely pharmacologic interest have not been neglected. For example, nicotine, muscarine, and strychnine are of little clinical usefulness but an understanding of their action is essential for any fundamental concept of the science of pharmacology. The purpose of the course in pharmacology is to acquaint the student with the scientific basis for the use of drugs in medicine; to do so, involves not only a consideration of the drugs commonly used in the clinic but also of the basic principles of the subject. The more practical minded may object to any attention paid to such drugs as nicotine and strychnine. However a text in pharmacology should not be a mere handbook of therapeutics but should serve as a foundation for the rational and scientific use of drugs, without losing sight of the ultimate objective which is the application of drug therapy in disease. It is only if this be done that the subject merits a place among the basic disciplines of the preclinical sciences." Dr. Grollman might well have applied the same philosophy toward the education of the pharmacist in his training for the all important function of standardizing, compounding and distribution of drugs. A list of references is appended to each chapter, the purpose of which is to cite monographs in which extended bibliographies may be found for those who wish to go to original sources. A brief discussion of prescription writing is given as an Appendix.—R.A.L.

Laboratory Manual for Vertebrate Physiology, by Donald M. Pace, Ph.D., Professor of Physiology and Pharmacology, The University of Nebraska and Carl C. Riedesel, M.S., Associate Professor of Pharmacology, Idaho State College. 1950. 227 Pages. Illustrated. Burgess Publishing Company. Price $3.25.

In a series of 51 well chosen laboratory exercises, the authors have given the student the basic ones necessary for the development of a physiological technique for the study of the physiological processes occurring in cells, tissues, and organs. A very commendable feature is the study of the basic mechanical apparatus for the production of stimuli and the recording of physiological reactions, which is so often confusing to the student. In illustrating the apparatus, excellent line drawings are used which clarify the principles of the mechanism whereas photographs often lead to confusion rather than clarification. Under such exercise statements are made and questions are asked that drive the point of the experiment home to the student. When the laboratory period is over the student has fixed in his mind something of value to him as he proceeds in his studies. Again we commend the authors and the publisher for producing a laboratory manual which will do much towards standardizing laboratory work in physiolo-

gy. It will contribute much toward building up the equipment in other laboratories for sound physiological teaching.—R.A.L.

Remington"s Practice of Pharmacy, by E. Fullerton Cook, Ph.C., B.Sc., B.Sc., M.Sc., Ph.D. and Eric W. Martin, Ph.C., B.Sc., M.S., Ph.D. with the collaboration of more than ninety associates. 1951. Tenth Edition. 1616 pages. Over 800 illustrations. The Mack Publishing Company. Price $16.00.

The authors and the collaborators are men of distinction in their respective fields and so well known that no comment is needed here. The Remington tradition has been maintained in this, the latest edition, by including between the covers of one book all the pharmaceutical specialties. This results, as it does in other fields, in producing a book of an excyclopoedic nature, which increases its usefulness as a book of reference. The great need in the past, and also in the present, is to have good teaching texts in the pharmaceutical specialties that would present the subject matter in a free and easy style that would appeal to the student rather than in a formal textbook style that is little more than a statement of facts. We believe that if the tremendous aggregation of talent represented by the editors and collaborators of the Tenth Edition could be turned loose on a series of texts, covering their respective disciplines, that our pharmaceutical teaching literature would be greatly enriched.—R.A.L.

Physiology of the Eye, Clinical Application, by Francis Heed Adler, M.A., M.D., F.A.C.S., William P. Norris and George E. de Schweinitz, Professor of Ophthalmology, School of Medicine, University of Pennsylvania. 1950. 709 pages. 319 illustrations including 2 in color. The C. V. Mosby Book Company. Price $12.00.

Among the commendable trends taking place in these latter days, is the writing of texts, by outstanding specialists, which deal with the function of parts of special organs and with organs as a whole. A comprehensive text on the relation of the physiology of the eye to the treatment of the diseases of that organ is most timely. There is no organ where drugs can be more usful when intelligently used, or do greater harm when used indiscriminately, than in the eye. This information should be the special concern of the pharmacist. The mechanics of the text are excllent and worthy of the subject matter.—R.A.L.

Progress in Chromatography 1938-1947, by Prof. L. Zechmeister, California Institute of Technology. 1951. 368 pages. Illustrated. John Wiley and Sons, Inc. Price $8.00.

For the literature prior to 1938 the reader is referred to a monograph entitled **Principles and Practices of Chromatography** by L. Zechmeister and L. Chalnoky, also published by John Wiley and Sons, Inc. In the present book the author demonstrates the high efficiency of

chromotographic adsorption analysis which still gives information when other analytical means fail. The author begins with a general discussion of the principles and practice of chromatography and the methods involved. The major part of the book covers the differences in the properties of organic substances important in chromatography and closes with a chapter in which inorganic chromatography is surveyed with emphasis on the separation of cations. A rather extensive biblicgraphy is also included.—R.A.L.

Laboratory Instructions in Plant Biology, by John B. Parker and John J. Clarke, The Catholic University of America, Washington, D. C. 1950. Third Edition. 80 pages. Illustrated. The C. V. Mosby Company. Price $1.25.

An excellent guide for the beginning study of the structures and processes which take place in the living plant of typical members of the plant kingdom. A brief story about the plant or plant group to be studied is given as an introduction to each study, which whets the interest of the student. References are given to textual sources where the student can obtain additional information. The line drawings are clear and well adapted.—R.A.L.

Laboratory Instructions in Animal Biology, by the same authors. 1950. Third Edition. 110 pages. The C. V. Mosby Company. Price $1.50.

The guide follows the same general plan that the authors have used in their Laboratory Instructions in Plant Biology. It is well done. The reviewer was a little disappointed that line drawings were not used as in the plant guide since, from his own experience as a student, he knows they would have been most helpful and could be used to advantage in many instances.—R.A.L.

Methods in Medicine, by George R. Herrmann, M.D., Ph.D., Professor of Medicine, University of Texas Medical Branch at Galveston. 1950. Second Edition, completely revised. 488 pages. The C. V. Mosby Company. Price $7.50.

This book is a revision of "The Manual of the Medical Service of Dr. George Dock", formerly Professor of Medicine, Washington University, St. Louis. The chapters cover the methods of routine case study, clinical laboratory procedures and tests, methods of clinical investigation, and therapeutic and dietetic procedures that have proven to be sound.—R.A.L.

Recent Advances in Pharmacology, by J. M. Robson, M. D., D. Sc., F. R. S. E., Reader in Pharmacology, Guy's Hospital Medical School, University of London and C. A. Keele, M. D., F. R. C. P. (London), Reader in Pharmacology and Therapeutics, Middlesex Hospital Medical School, University of London, 1950. 418 pages, illustrated. The Blakiston Company. Price $5.50.

In view of the rapid advancements in almost every field of pharmacology, books of this type serve the very useful purpose of presenting for critical evaluation the newer drugs used in the treatment of a wide variety of pathological conditions. For this volume the authors have chosen groups of drugs such as anticholinesterase substances, antihistaminics, antithyroid drugs, the steroids of the gonads and adrenal cortex, antibiotics, antimalarials, nitrogen mustards, analgesics, hemopoietic system stimulants, and anticoagulants.

Although the chapters are primarily written for the pharmacologist and the clinical investigator, the reviews are so well subdivided into chemical, physiological, pharmacological and clinical aspects that they should prove valuable reading for all teachers and students in the pharmaceutical field, as well as to practising pharmacists who wish to keep abreast of recent progress. The chapters on mode of action of drugs and of the control of the body functions by chemical substances, including discussions dealing with enzymes, dimercaprol, sulfonamides, and various other substances, are of special interest to those seeking a deeper understanding of pharmacological reactions. The same holds true for the chapter on the fate of drugs in the body, which takes up in considerable detail the value of employing radio isotopes. The economic possibility of controlling trypanosomiasis in livestock by periodic inoculations with antrycide, and thus saving Sudanese cattle for human consumption, is explored in a separate chapter.

Finally, a chapter is devoted exclusively to the problem of evaluation of the actions of drugs in man, presenting the most fundamental principles of statistics applicable to that problem and several concrete illustrations of such application. We believe that a thorough understanding of this chapter will be of essential value to all beginning students in bioassay.—H.G.O.H.

The American Board of Clinical Chemistry, Inc., a certifying board, has been established by representatives from the American Chemical Society, Inc., American Institute of Chemists, Inc., and the American Society of Biological Chemists, Inc. It is the purpose of this Board to

encourage the study, improve the practice, elevate and establish standards and advance the science of that specialized branch of chemistry entitled "clinical chemistry"; to grant and issue certificates or other recognition of special knowledge in clinical chemistry to voluntary applicants who in accordance with the by-laws, rules and regulations of the Board have established their fitness and competence; to prepare and furnish in the public interest a registry of individuals with specialized knowledge in clinical chemistry who have from time to time been granted certificates by the Board. The Board is analagous in purpose, function and organization to the various medical specialty boards which have served for many years to establish standards and qualifications for persons wishing to practice in a specialized field in medicine. Requirements for admission to examination and certification are briefly as follows:

1. Presentation of evidence of satisfactory moral and ethical standing.

2. Educational background equivalent to that of a Doctor of Science. (Ph.D., M.D., M.Sc., etc. may be offered).

3. Accredited courses in analytical, organic, physical and biological chemistry.

4. Either three years' full-time experience in an acceptable clinical laboratory, or five years in a position of assistant professor or above in biological chemistry, clinical chemistry or related fields.

5. Pass a written and/or oral examination on broad principles of clinical chemistry.

6. Candidates without the full formal educational requirements set forth above but who have practiced clinical chemistry for ten years in a responsible position in an acceptable clinical laboratory, may be certified without examination at the discretion of the Board.

7. Candidates who file applications prior to July 1, 1952, whose qualifications based on training and experience satisfy the Board, may be certified without examination.

Prescribed forms for application and further information may be obtained from the office of the Secretary-Treasurer, Dr. Jos. W. E. Harrisson, 1921 Walnut Street, Philadelphia 3, Pennsylvania. A fee of $1.00 must accompany the application request, to cover clerical and mailing costs. All requests should give the name of the applicant in the manner it is to be recorded, as application forms will be so issued.

A Report of Progress by the Health Information Foundation has recently been issued by President W. H. P. Blandy, Admiral, U.S.N. (Retired). As is well known, the H.I.F. is committed by its charter to a two-fold task aimed at improving the health of the nation. First, it collects facts about existing health facilities and second, it distributes information based on analysis of these facts. Since its establishment early in 1950, it has undertaken eight specific projects in the collection and analysis of health facts.

The projects now being carried on are a study of a community clinic; a study of a self-survey; a study of catastrophic illness insurance; a study of financing hospital care; a study on payment of medical and other health care; the assembling of a health literature library; making direct contact with progressive communities; and the establishment of communication lines to facilitate future collections and distribution of health information. These studies are directed toward obtaining patterns, by the study of successful projects, which may be used in furthering the health of other communities.

The distribution of information collected by the Foundation is accomplished through speeches by the Foundation's President; by the Foundation's bulletin, **Progress in Health Services**; through pictorial health messages; by releases and news items; by monthly radio news scripts; and by magazine and radio coverage of health news.

Robert A. Statler, formerly chief pharmacist of the Veterans Administration Hospital at Aspinwall, Pennsylvania, has been appointed chief of the training section of VA's pharmacy division in Washington, D. C. Mr. Statler is a graduate from the University of Pittsburgh in 1942 and that same year entered the Army and remained in active service for four year. He was discharged in 1946 as a first lieutenant in the Medical Service Corps in which he currently holds a reserve commission. After the war he returned to a prescription pharmacy in Pittsburgh and in 1947 he joined VA as a pharmacist at its hospital in Butler, Pennsylvania. Later in 1947 he transferred to the Aspinwall hospital as chief pharmacist and remained there until he was called to Washington. The pharmacy division's training section, of which Mr. Statler is chief, develops and establishes programs to keep VA pharmacists abreast of modern trends in hospital pharmacy and therapy and stimulates the attendance of VA pharmacists at the annual Institute on Hospital Pharmacy conducted by the American Hospital Association, the American Pharmaceutical Association and the American Society of Hospital Pharmacists. Future plans under consideration include the establishment of internships at selected hospitals, in-service training programs and the issuance of an educational bulletin series.

Tentative Program for the Fifty-Second Annual Meeting Statler Hotel

President, Hugo H. Schaefer; Vice-President, Harold G. Hewitt; President-elect, J. Allen Reese; Secretary-Treasurer, Louis C. Zorpf; Chairman of the Executive Committee, Joseph B. Burt; Delegate to the House of Delegates, J. Lester Hayman.

Saturday, August 25

— Room

10:00 A.M. Meeting of the Executive Committee
2:00 P.M. Meeting of the Executive Committee

Sunday, August 26

— Room

9:30 A.M. Meeting of the Executive Committee

FIRST SESSION

Sunday, August 26, 2:00 P. M.

— Room

1. Roll Call
2. Appointment of Committee on Resolutions
3. Appointment of Nominating Committee
4. Appointment of Auditing Committee
5. Report of President, Hugo H. Schaefer
6. Report of the Secretary-Treasurer, Louis C. Zopf
7. Report of the Executive Committee, Joseph B. Burt
8. Report (Abstracts) of Standing Committees.
   (a) Committee on Relation of Boards and Colleges, Thomas D. Rowe, General Chairman
   (b) Committee on Libraries, Charles O. Lee
   (c) Committee on Activities for Alumni, Linwood F. Tice
   (d) Committee on Problems and Plans, Rufus A. Lyman
   (e) Committee on Status of Pharmacists in Government Service, Charles H. Rogers
   (f) Committee on Educational and Membership Standards, Arthur E. James

   Committee on Pharmaceutical Research, William J. Husa
   (h) Committee on Graduate Study, Earl P. Guth
   (i) Committee on Curriculum, George L. Webster.

Sunday, August 26, 7:30 P. M.
— Room

Last year's program consisted of Open Forum on the Professional Preparation of Pharmacists—no program scheduled for this year.

TEACHERS' CONFERENCES

Monday, August 27, 9:00 A. M.

Note: For individual conference programs see pages—
Conference of Teachers of Pharmacy.
— Room
Conference of Teachers of Pharmaceutical Economics
— Room
Conference of Teachers of Chemistry
— Room
Conference of Teachers of Biological Sciences
— Room
Joint Teachers' Conference ? ? ?
Conference of Teachers for Graduate Instruction
— Room

SECOND SESSION

Monday, August 27, 2:00 P. M.
— Room

1. Report of the Credentials Committee.
2. In Memoriam.
3. Recommendations from Teachers' Conferences.
4. Address of the President-elect, J. Allen Reese.
5. "The Research Grants and Fellowship Program of the National Institute of Health," by Kenneth M. Endicott, M. D., Scientific Director, Division of Research Grants.
6. "Needs of Colleges of Pharmacy," by Richard A. Deno.
7. Panel Address, by W. Paul Briggs.
8. Is There a Need for Association?
9. Report of the Editor of the American Journal of Pharmaceutical Education, R. A. Lyman.

JOINT BANQUET A. A. C. P. AND N. A. B. P.

Monday, August 27, 6:30 P. M.
— Room

Joint banquet with National Association of Boards of Pharmacy
Toastmaster: Hugo H. Schaefer, President, A. A. C. P.
Address: by G. Lester Anderson, Dean of Administration, The University of Buffalo.

THIRD (FINAL) SESSION

Tuesday, August 28, 2:00 P. M.
— Room

1. Report of the American Council on Pharmaceutical Education, P. H. Costello.
2. Report (Abstracts) of Special Committees:
   (a) Committee on Predictive and Achievement Tests, E. L. Cataline.
   (b) Committee on Professional Relations, P. A. Foote.
   (c) Committee on Personnel Problems, E. A. Brecht
   (d) Committee on Emergency Problems, Hugh Muldoon
   (e) Committee on Teachers Conferences, Joseph B. Sprowles.
   (f) Committee on World Congress for Pharmaceutical Education, George Urdang.
   (g) Committee on Audio-Visual Education, Donald C. Brodie.
   (h) Committee on Constitution and By-Laws, Lloyd M. Parks.
   (i) Committee on Functions of the American Association of Colleges of Pharmacy, Arthur H. Uhl.
   (j) Committee on Office of Permanent Secretary of A. A. C. P., Arthur H. Uhl.
3. Reports of Special Representatives:
   (a) Delegate to the American Council on Education, Noel Foss, B. V. Christensen.
   (b) Representatives to the American Council on Pharmaceutical Education, Glenn L. Jenkins.
   (c) Representatives to the National Drug Trade Conference, Ernest Little. ? ?
   (d) Repreentatives to the Druggist Research Bureau?
   Does this group still function?
   (e) Representatives to the National Wholesale Druggists Association, Earl R. Serles.
   (f) Directors of the American Foundation for Pharmaceutical Education, H. Evert Kendig.
   Should the report of the Seminars be brought in here ? ?
4. Report of Auditing Committee.
5. Report of Nominating Committee.
7. Unfinished Business.
8. Election of Officers.
9. New Business.
10. Executive Session.
11. Installation of Officers.
12. Adjournment.

Montana

Montana State University, School of Pharmacy, Missoula. (1917)
Curtis H. Waldon, Dean.

Nebraska

The Creighton University, College of Pharmacy, Omaha. (1918)
William A. Jarrett, Dean.

University of Nebraska, College of Pharmacy, Lincoln. (1913)
Joseph B. Burt, Dean.

New Jersey

Rutgers University, The State University of New Jersey, New Jersey College of Pharmacy, Newark. (1923)
Thomas D. Rowe, Dean.

New York

University of Buffalo, School of Pharmacy, Buffalo. (1939)
A. B. Lemon, Dean

Columbia University, College of Pharmacy of the City of New York. (1939)
Charles W. Ballard, Dean.

Fordham University, College of Pharmacy, New York. (1939)
James H. Kidder,. Dean

Long Island University, Brooklyn College of Pharmacy, Brooklyn. (1939)
Hugo H. Schaefer, Dean.

Union University, Albany College of Pharmacy, Albany. (1945)
Francis J. O'Brien, Dean

North Carolina

University of North Carolina, School of Pharmacy, Chapel Hill. (1917)
Edward A. Brecht, Dean.

North Dakota

North Dakota Agricultural College of Pharmacy, Fargo. (1922)
William P. Sudro, Dean.

Ohio

Ohio Northern University, College of Pharmacy, Ada. (1925)
Rudolph H. Raabe, Dean.

University of Cincinnati, Cincinnati College of Pharmacy. (1947)
J. F. Kowaleski, Dean.

The Ohio State University, College of Pharmacy, Columbus. (1900)
B. V. Christensen, Dean.

University of Toledo, College of Pharmacy, Toledo. (1941)
Charles H. Larwood, Dean

Oregon

Oregon State College, School of Pharmacy, Corvallis. (1915)
George E. Crossen, Dean

Pennsylvania

Duquesne University, School of Pharmacy, Pittsburgh. (1937)
Hugh C. Muldoon, Dean.

Philadelphia College of Pharmacy and Science, Philadelphia. (1900)
Ivor Griffith, Dean.

Temple University, School of Pharmacy, Philadelphia. (1923)
Joseph B. Sprowls, Dean.

University of Pittsburgh, School of Pharmacy, Pittsburgh. (1900)
Edward C. Reif, Dean.

Philippines

University of the Philippines, College of Pharmacy, Manila. (1917)
Patrocinio Valenzuela, Dean.

Puerto Rico

University of Puerto Rico, College of Pharmacy, Rio Piedras. (1926)
Luis Torres-Diaz, Dean.

Rhode Island

Rhode Island College of Pharmacy and Allied Sciences, Providence. (1926)
W. Henry Rivard, Dean.

South Carolina

Medical College of the State of South Carolina, Charleston. (1940)
William A. Prout, Dean.

University of South Carolina, School of Pharmacy, Columbia. (1928)
Emery T. Motley, Dean.

South Dakota

South Dakota State College, Division of Pharmacy, Brookings. (1926)
Floyd J. Leblanc, Dean.

Tennessee

University of Tennessee, School of Pharmacy, Memphis. (1914)
Robert L. Crowe, Dean.

Texas

University of Texas, College of Pharmacy, Austin. (1926)
Henry M. Burlage, Dean.

Virginia

Medical College of Virginia, School of Pharmacy, Richmond. (1908)
R. Blackwell Smith, Jr., Dean.

Washington

State College of Washington, School of Pharmacy, Pullman. (1912)
Pearl H. Dirstine, Dean.

University of Washington, College of Pharmacy, Seattle. (1908)
Forest J. Goodrich, Dean.

West Virginia

West Virginia University, College of Pharmacy, Morgantown. (1920)
J. Lester Hayman, Dean.

Wisconsin

University of Wisconsin, School of Pharmacy, Madison. (1900)
Arthur H. Uhl, Dean.

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